ziehmimaging
dedicated to clinical innovation

Ziehm 8000

Technical Manual

Normal use

The medical equipment is intended for fluoroscopies in the field of surgery, e.g. in traumatology, orthopedics, neurosurgery, urology, cardiology. Third-party devices and components used in combination with this system must comply with the safety requirements according to IEC 60601-1 and/or IEC 60601-1-1 or furnish proof of an equivalent degree of safety.

To ensure CE conformity, these components must have a CE approval in accordance with Council Directive 93/42/EEC. In addition, a declaration in compliance with Article 12 of the said directive must be provided.

For components without CE approval, a conformity assessment procedure is obligatory.

Proper and safe operation of the system requires adequate transportation, storage, assembly and installation as well as appropriate use and maintenance.

The limit values indicated in the present document must not be exceeded; this applies also when putting the system into service.

The system is not suitable for interventional procedures acc. to IEC 60601-2-43.

Contraindications to the use of X-rays

The exposure of humans to ionizing radiation must always be medically justified. Especially on pregnant women, children and adolescents this procedure should be used with caution or be avoided altogether. However, the final decision lies with the attending physician or attending surgeon.

Ziehm 8000 product family

The Ziehm 8000 product family comprises the following systems:

- Ziehm 8000 (not available in the USA)
- Ziehm Compact (not available in the USA)
- Ziehm Compact Litho (not available in the USA)
- Ziehm 7000 Plus (available only in the USA)
- Ziehm 7000 Plus (Compact Version) (available only in the USA)

Unless stated otherwise, all information given here for the Ziehm 8000 also refers to the Ziehm Compact and Ziehm Compact Litho.

Authorized personnel

Only authorized personnel are allowed to assemble and repair the medical equipment described in this manual. Authorized personnel are persons who have attended an appropriate training course provided by the manufacturer. These persons will receive the entire documentation that is required for service work.

Exclusion of liability

The manufacturer accepts responsibility for the safety, reliability and performance of the system only if

- any installation, modification or repair work is carried out exclusively by persons authorized by the manufacturer;
- the electrical installation of the site where the system is operated complies with the requirements of VDE 0107 or the corresponding national regulations of the country of installation;
- only original spare parts or components that comply with Ziehm Imaging's specifications are used;
- the system is used in accordance with the user manual.

The warranty becomes invalid in case that any repair, modification or installation work is carried out by unauthorized personnel, or any seals on components are broken. No consequential damages will be accepted either.

CE 1275

The equipment conforms to Class IIb according to Council Directive 93/42/EEC.

This document has been written and reviewed originally in German and translated.

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Quality Standards
These Operating Instructions were produced in accordance with a certified QM system as per DIN EN ISO 13485. It conforms to the requirements of Council Directive 93/42 EEC, Annex I, and other applicable norms. The information provided in this document may be updated at regular intervals. Subject to change without prior notice.

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1 General Information

This manual is designed to enable owners and operators of the system to operate the systems described herein safely and efficiently.

Scope of validity of these Operating Instructions

Ziehm 8000 with the options Ziehm Compact and Ziehm Compact Litho, software version L2.04 or higher.

All illustrations in these Operating Instructions are exemplary only, and may differ from the actual situation.

The present Operating Instructions describe a system with maximum configuration. The system configuration chosen by you may not contain all options and functions described here.

Separate operating instructions

For several system options, separate operating instructions may be available. They are supplied with the system, provided that the system configuration includes the respective option. You will find a corresponding reference to those operating instructions in the relevant sections of this document.

Environmental compatibility

The system does not produce any waste during operation.

When the system has reached the end of its useful service life, the relevant waste disposal regulations of the country of installation must be observed.

Ziehm Imaging GmbH takes back your devices and undertakes to dispose of them appropriately in accordance with national regulations. If you want to return a device, please contact the Ziehm Imaging Service department.

The useful service life defined for this medical device is seven years. After this period, Ziehm Imaging GmbH must check whether the technology used is appropriate.

1.1 Typographical conventions

In this manual, the following notations and formats are used to highlight certain elements of the control panel or the documentation itself:

Element	Format	Example
Control panel elements (buttons, tabs and boxes), operating modes, functions	Bold	**Fluoro**
Cross-references	Italic, preceded by an arrow	→ *Ch. 17, p. 17-1*
Procedure steps	Preceded by a •	• Press the **OK** button.

Table 1-1 Notations and formats used in this manual

1.2 Conventions for safety instructions

The present document does not constitute a complete catalog of all safety measures necessary for the operation of the respective medical equipment, since special operating conditions may require further measures. However, it does contain instructions which must be observed in order to ensure the personal safety of operating staff and patients as well as to avoid damage to property. These instructions are highlighted as follows:

DANGER

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING

WARNING indicates a hazardous situation which, if not avoided, may result in death or serious injury.

CAUTION

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

NOTICE

NOTICE indicates a property damage message.

NOTE

Notes are merely informative. Additional useful information and hints are provided for the operator here.

1.3 Accessories

The accessories are in a separate cardboard box on the pallet. Depending on the system configuration (options), the cardboard box contains the following accessory items:

	Accessories	**Qty.**
All systems	Operating Instructions	1
	CD (Operating Instructions)	1
	CD (Technical Manual)	1
	Specifications and Certificates	1
	Coupling cable (7.5 m)	1
	Equipotential grounding cable (6 m) (Art. No. 24054)	1
	Touch-up paint RAL 9001 (Art. No. 89655)	1
	Touch-up paint RAL 6027 (Art. No. 89615)	1
Options	Mounting material (Art. No. 88711)	1
	CD writer	
	CD-RW (640 MB)	1
	Video printer	
	Operating instructions for video printer	1
	Printer paper	1 roll
	Printer transparent film (depending on printer model)	1 roll
	DICOM	
	RJ45 interface with Cat.5 patch cable (10 m) (Art. No. 24452)	1
	Wireless LAN transceiver	1
	Fiber-optic connection (FOC): ST coupling, 10base-FL or 100base-FX	1

Table 1-2 Accessories

	Accessories USA:	Qty.
All systems	Operating Instructions	1
	CD (Operating Instructions)	1
	Technical Manual	1
	CD (Technical Manual)	1
	CD (Service Manual)	1
	CDRH Maintenance Report	1
	Specifications and Certificates	1
	Coupling cable with UL marking (7.5 m, Art. No. 24815)	1
	Equipotential grounding cable (6 m) (Art. No. 24054)	1
	Mounting material (Art. No. 88711)	1
	Skin cone with safety label (Art. No. 89694)	1
	Touch-up paint RAL 9001 (Art. No. 89655)	1
	Touch-up paint RAL 6027 (Art. No. 89615)	1
Options	**CD writer**	
	CD-RW (640 MB)	1
	Video printer	
	Operating instructions for video printer	1
	Printer paper	1 roll
	Printer transparent film (depending on printer model)	1 roll
	DICOM	
	RJ45 interface with Cat.5 patch cable (10 m) (Art. No. 24452)	1

Table 1-3 Accessories USA

2 Safety Instructions

2.1 General safety instructions

WARNING

WARNING

You must be familiar with the contents of the present Operating Instructions in order to be able to operate the system as intended. Read and understand the present Operating Instructions before operating the system.

It is important to observe all directions, safety instructions and warnings!

The responsibility for any C-arm-assisted surgical intervention lies with the physician in charge.

NOTICE

NOTICE

Supplementary equipment used in combination with the Ziehm 8000 must comply with the safety requirements according to IEC 60601-1 and/or IEC 60601-1-1 or furnish proof of an equivalent degree of safety.

To ensure CE conformity, these components must have a CE approval in accordance with Council Directive 93/42/EEC. In addition, a declaration in compliance with Article 12 of the said directive must be provided.

For components without CE approval, a conformity assessment procedure is obligatory.

If you combine the Ziehm 8000 with equipment which does not comply with these requirements, the safety of the entire system is no longer given and the warranty will become invalid.

Please note that a combination with third-party devices must be approved by Ziehm Imaging. A combination must be possible in particular by the intended use of the two devices.

Only properly trained personnel are allowed to operate the system. **Operation**

The system may only be operated by properly trained personnel under the direction of a physician. **Operation (USA)**

Assembly and service

Only authorized personnel are allowed to assemble the system and to provide technical service. The necessary qualifications can only be obtained by attending a training course provided by the manufacturer.

CAUTION

Always observe the relevant regulations of the country of installation for putting the system into service, training of personnel and maintenance.

WARNING

Never use the system if you suspect any electrical or radiation-generating components to be defective or if the system exhibits unexpected malfunctions!

WARNING

Before opening any part of the equipment or removing the protective covers, you must disconnect the system from the power supply.

2.2 X-rays

General

The system produces X-rays. If you do not observe the safety measures and precautions required by your local radiation protection regulatory body or other national radiation protection measures and precautions, these X-rays can be hazardous both to operating staff and other persons within the radiation zone of occupancy.

WARNING

The system may only be operated by personnel who has undergone radiological training.

WARNING (USA)

The system may only be operated by properly trained personnel under the direction of a physician.

⚠ WARNING

WARNING

The relevant radiation protection regulations of the country of installation must be observed.

⚠ WARNING

WARNING

In order to avoid unintentional radiation, the foot switch must be hung up on the foot switch support when the system is switched on, but not in use.

Protection of staff

Staff members who stay within the radiation controlled area must wear X-ray protective clothing.

The radiation controlled area depends upon the size of the image intensifier installed and has the following radius:

- 15 cm image intensifier: 3 m
- 23 cm image intensifier: 4 m

Protection of the patient

To minimize the radiation burden of the patient, you must keep the source/skin distance as large as possible. The generator design guarantees a minimum source/skin distance of 20 cm.

⚠ WARNING

WARNING

Additional material located in the beam path (e.g. an operating table not suitable for X-raying) may result in a dose increase when using a fluoroscopy mode with automatic exposure rate control.

⚠ WARNING

WARNING

When you initiate radiation and no live image is displayed although all necessary settings have definitely been made, please contact your after-sales service center!

2.3 Electromagnetic compatibility

Medical electrical equipment requires special precautionary measures with respect to EMC and must be installed and put into service in accordance with the EMC guidelines contained in the accompanying documents.

Portable and mobile RF communications equipment may interfere with medical electrical equipment.

All operating modes of the system have been considered in the EMC tests. There are no exceptions to the rules.

Only conductors, connecting cables and accessories that are specified by the manufacturer may be used.

WARNING

Using components other than those specified may result in increased electromagnetic emissions or reduced electromagnetic immunity.

Please observe also the *Manufacturer's Declaration concerning Electromagnetic Compatibility according to IEC 60601-1-2* in the Technical Manual.

2.4 Protective grounding

The system must be connected only to power systems having a separate ground connection.

2.5 Equipotential grounding

Heart and brain examinations

If you use the system in combination with other equipment for examinations of the heart or brain or the surrounding anatomical regions, equipotential grounding is required for patient and operating staff safety (IEC 60601-1-1).

2.6 Laser radiation

Laser positioning device

As an option, the system may be equipped with a laser positioning device at the image intensifier and/or generator.

The laser positioning device uses diode laser modules which emit laser radiation. **Do not under any circumstances** look directly at the laser beam or any scattered laser radiation – either with the naked eye or with optical instruments.

The laser positioning device is a Class 2M laser product according to IEC 60825-1. Make sure to comply with all operating safety precautions when using the laser positioning device.

The maximum power output of continuous laser radiation, measured at the laser beam apertures, is <1 mW. The wavelength of the emitted radiation is 635 nm.

WARNING

Laser radiation – Do not stare into beam or view directly with optical instruments (Laser Class 2M according to IEC 60825-1).

Please observe the provisions of IEC 60825-1, Section 3, “User’s Guide” for operation of the laser positioning device.

Viewing the laser output with certain optical instruments (e.g. eye loupes, magnifiers and microscopes) within a distance of 100 mm may pose an eye hazard.

CAUTION (USA)

LASER RADIATION – DO NOT STARE INTO BEAM

CLASS II LASER PRODUCT (in accordance with FDA 21 CFR, Subchapter J, Section 1040.10-11)

Maintenance

The laser positioning device is maintenance-free. Any adjustment or repair which might become necessary must be carried out by the manufacturer or a suitable qualified service engineer who has received appropriate training from the manufacturer.

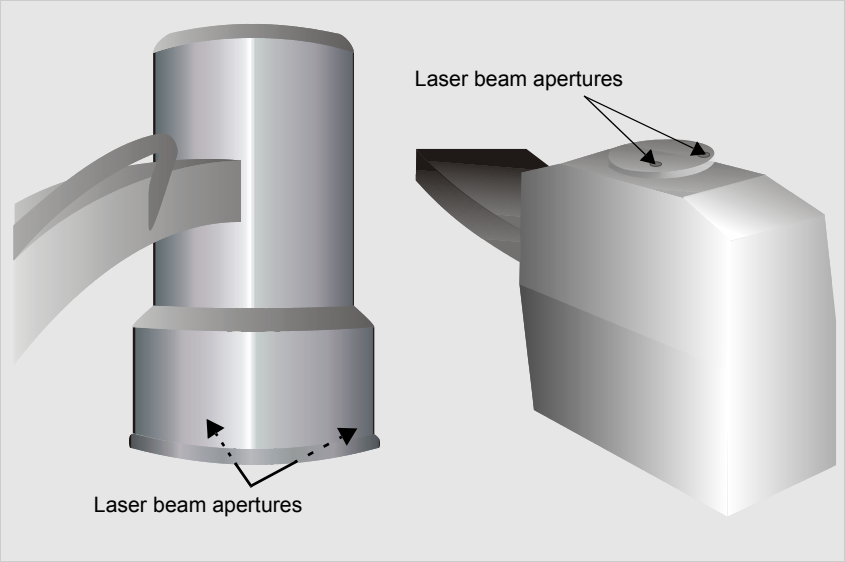


Fig. 2-1 Laser beam apertures on an image intensifier with integrated laser positioning device (left) and on the generator (right)

2.7 Printers

NOTICE

NOTICE

When printing on the Sony® UP-990 video printer, always use the **CUT** button on the printer for cutting off the printer paper. Tearing off the printer paper may damage the video printer.

As opposed to that, on the Sony® UP-970 video printer you must tear off the printer paper!

Please refer to the *Operating Instructions* of the corresponding printer.

NOTICE

NOTICE

Temperatures above 40°C and relative air humidity above 60% may cause stains on the printer's heat-sensitive paper.

2.8 Mechanics

⚠ WARNING

WARNING

Never pull at the power cable or coupling cable of the monitor cart in order to move the cart to another position.

Otherwise severe equipment damage may result, thus leading to severe injuries.

2.9 System failure

⚠ CAUTION

CAUTION

The system is a highly complex medical device that in rare cases can fail like any other electrical device in spite of comprehensive tests and maintenance.

This may cause obstructions to the operational procedure.

Please keep an emergency plan ready for this case.

⚠ CAUTION

CAUTION

Data transmission of the system can fail.

This may cause obstructions to the operational procedure.

Please keep an emergency plan ready for this case.

⚠ CAUTION

CAUTION

The system can fail due to mechanical defects.

This may cause obstructions to the operational procedure.

Please keep an emergency plan ready for this case.

3 Unpacking the System

CAUTION

Only authorized personnel (→ *p. 2*) are allowed to unpack and assemble the system.

3.1 Unpacking the system on the pallet

Upon delivery, the pallet contains the following system parts:

- Monitor cart (→ *Ch. 3.1.5, p. 3-8*)
- 23", 24" flat-screen monitor or 18" flat-screen monitors (→ *Ch. 3.1.3, p. 3-6*)
- C-arm stand (→ *Ch. 3.1.4, p. 3-6*)
- Ramp (for drop shipments) (→ *Ch. 3.1.2, p. 3-3*)
- Accessories (→ *Ch. 1.3, p. 1-4*)

3.1.1 Unpacking the pallet on delivery to distributors

To unpack the full pallet, do the following:

Fig. 3-1 Packed pallet

- Cut the plastic straps and remove them.
- Check the two shock watch devices.
- Remove the shipping tape from the cardboard box and open it.
- Remove the clout nails holding the cardboard box to the pallet.
- Lift the cardboard box off the pallet.

Fig. 3-2 Pallet with foil wrapping

- Cut the wrap foil open and fold it back.

Fig. 3-3 Unwrapped pallet

3.1.2 Unpacking the pallet on drop shipments

In drop shipments the pallet is equipped with a ramp. This ramp is required to move the C-arm stand off the pallet.

To unpack the full pallet, do the following:

Fig. 3-4 Packed pallet

- Cut the plastic straps and remove them.
- Check the two shock watch devices.
- Remove the shipping tape from the cardboard box and open it.
- Unfasten the screws that attaches board 4 to board 3 and 2 and remove board 4 (→ *Fig. 3-5*).

Fig. 3-5 Ramp packing in the cardboard box

- Unfasten the screws on the outside of the box, attaching board 3 on the inside of the cardboard box (→ *Fig. 3-6*), and remove board 3.

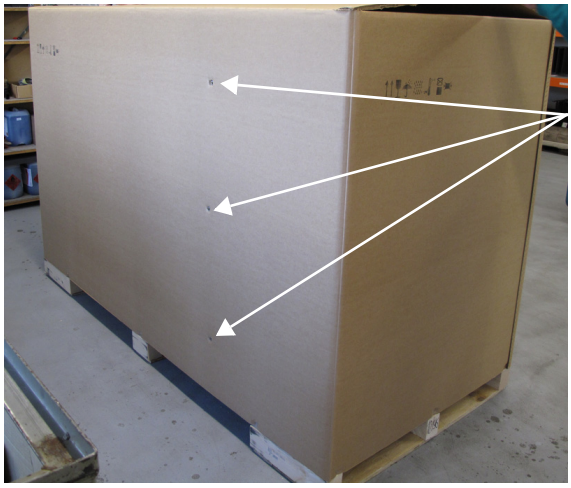


Fig. 3-6 Screws for attachment of the lateral boards

- Unfasten the screws on the outside of the box, attaching board 2 on the inside of the cardboard box (→ *Fig. 3-6*), and remove board 2.
- Remove the clout nails holding the cardboard box to the pallet.
- Lift the cardboard box off the pallet.

Fig. 3-7 Pallet and ramp with foil wrapping

- Unfasten the two screws attaching board 1 on the ramp, and remove board 1.
- Lift the ramp off the pallet and place it to the short front side of the pallet.
- Remove the fixing clamps from the drill holes on the pallet.

Fig. 3-8 Fixing clamp hooked up in the drill holes on the pallet

- Attach the ramp to both sides of the pallet using the fixing clamps (→ *Fig. 3-9*).

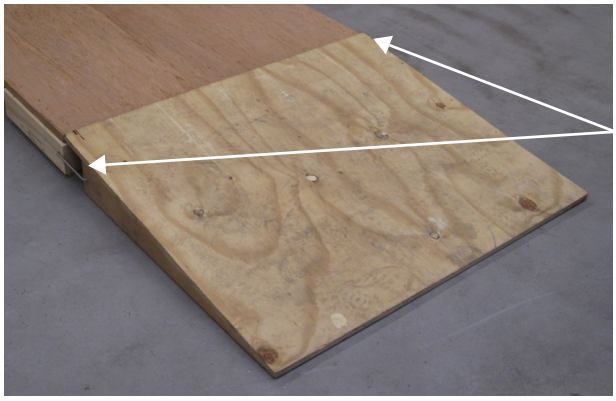


Fig. 3-9 Fixing clamps attaching the ramp

- Cut the wrap foil open and fold it back.

Fig. 3-10 Unwrapped pallet

3.1.3 Unpacking the monitors

3.1.3.1 Flat-screen monitors

The monitors are on a transport rack that is mounted on the pallet.

To unpack the flat-screen monitors, do the following:

- Undo the wood screws holding the transport rack to the pallet.
- Remove the bubble wrap from the monitors.
- Lift the flat-screen monitors off the pallet and carefully place them on a suitable surface.
- Undo the four screws M6×12 that attach the transport rack to the monitor neck.
  The screws M6×16 needed for attaching the monitor head to the monitor cart base are contained in the cardboard box with the accessories (→ *Ch. 1.3, p. 1-4*).

3.1.4 Unpacking the C-arm stand

The C-arm stand is attached to the pallet by means of retaining brackets.

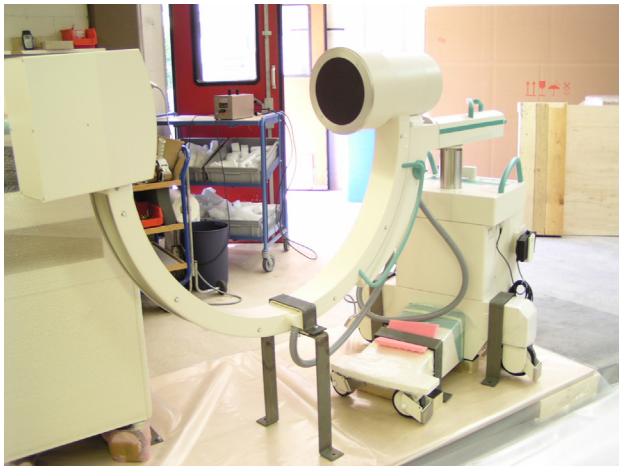


Fig. 3-11 Mobile C-arm stand on the pallet

To unpack the C-arm stand, do the following:

- Remove all packing materials (bubble wrap, foam rubber, styrofoam).

The C-arm stand is attached to the pallet by means of 5 retaining brackets:

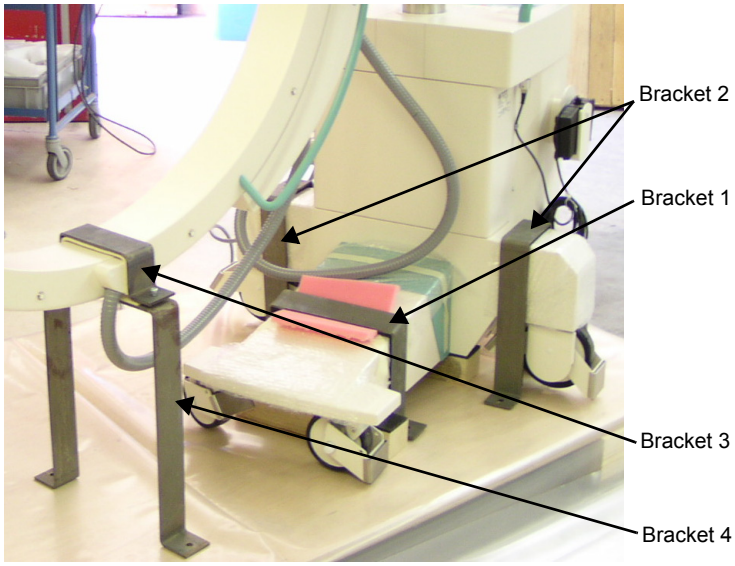


Fig. 3-12 Overview of all retaining brackets

- Undo the screws holding retaining bracket 3 to retaining bracket 4, and remove retaining bracket 3.
- Undo all screws holding retaining brackets 1, 2 and 4 to the pallet.
- Remove all retaining brackets from the pallet.
- Remove the wooden laths from below the C-arm stand (→ *Fig. 3-13, p. 3-7*). Lift the C-arm stand slightly for that purpose.

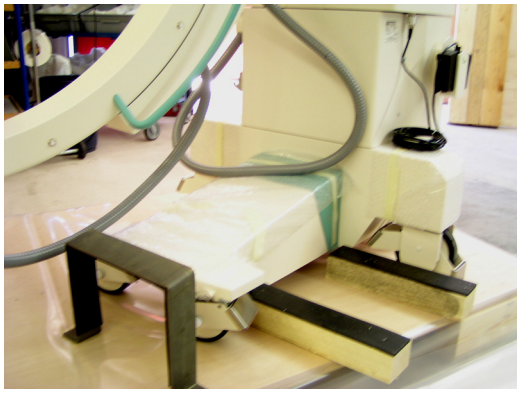


Fig. 3-13 Position of the wooden laths

- Put the C-arm into an upright position (orbital rotation).
- Remove the styrofoam block jammed between the image intensifier and the horizontal carriage.
- Carefully push the C-arm stand down from the pallet using a ramp.

3.1.5 Unpacking the monitor cart

The monitor cart is mounted on the pallet by means of a transport rack.

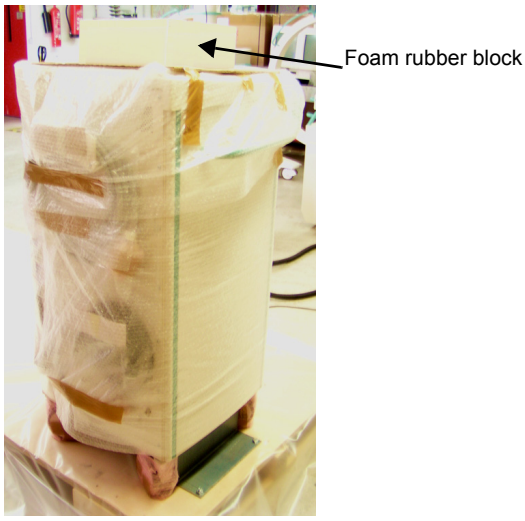


Fig. 3-14 Monitor cart on the pallet

To unpack the monitor cart, do the following:

- Remove the foam rubber block and all other packing materials (bubble wrap, foam rubber).
- Undo the wood screws holding the transport rack to the pallet.
- Place a padding on the pallet and, with the assistance of a second person, lay the monitor cart down on its side on the pallet.

WARNING

Due to the heavy weight of the monitor cart there is a risk that it will tilt over if not blocked. Therefore never move the cart alone into a lateral position, always ask a second person to assist you!

- Remove the bubble wrap from the monitor cart wheels.
- Undo the screws holding the transport rack to the monitor cart and remove the transport rack.
- Put the monitor cart back into an upright position with the help of a second person and remove the padding from the pallet.
- Carefully push the monitor cart down from the pallet using a ramp.
- Remove the wrap foil from the pallet.

You may now proceed to mounting the flat-screen monitors to the monitor head → *Ch. 4.1.2, p. 4-5*.

4 Assembling the System

CAUTION

Only authorized personnel (→ *p. 1-2*) are allowed to unpack and assemble the system.

4.1 Assembly

For international shipments on a pallet, the monitor head (23" or 24" flat-screen monitor, 18" flat-screen monitors) of the Ziehm 8000 has been dismounted. Consequently, you must reattach the monitor head to the monitor cart base.

In addition, you must establish all cable connections (→ *Ch. 4.2, p. 4-8*).

4.1.1 Mounting the 23" or 24" flat-screen monitor

NOTICE

NOTICE

Always wear cotton gloves when installing, testing or making settings on displays or screens.

To mount the 23" or 24" flat-screen monitor to the monitor cart base, do the following:

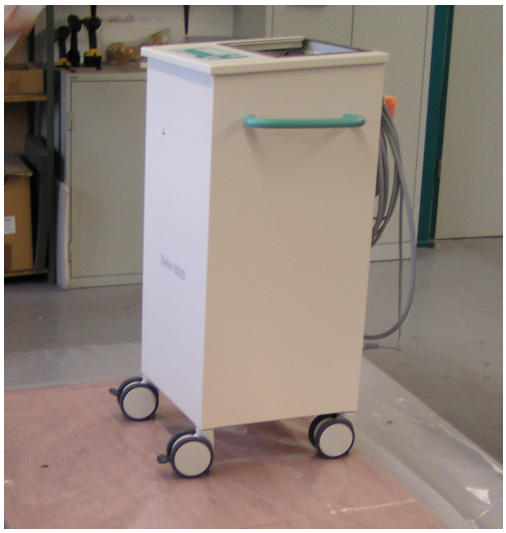


Fig. 4-1 Monitor cart base without monitor head

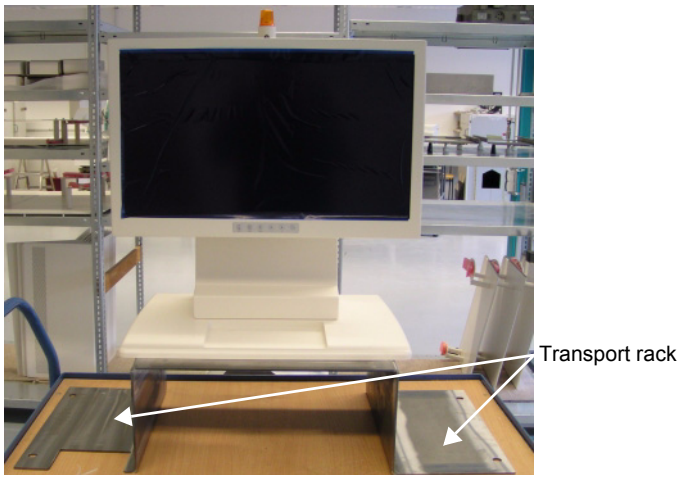


Fig. 4-2 23" or 24" flat-screen monitor on the transport rack

NOTICE

NOTICE

Never place the flat-screen monitor directly on some surface, always place them on the transport rack.

- Remove the rear cover of the monitor cart base.

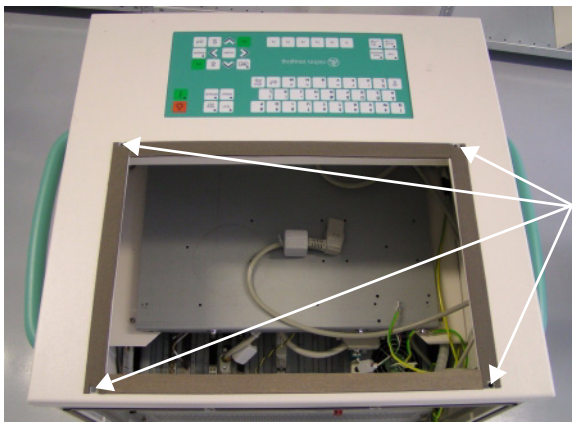


Fig. 4-3 Holes for the four screws M6×16 for attaching the flat-screen monitor to the monitor cart base

- With the help of a second person, lift the flat-screen monitor and place them on the monitor cart base.

WARNING

The flat-screen monitor cannot be lifted by one person alone. Therefore always ask a second person to assist you in placing the monitor on the monitor cart base.

- Attach the flat-screen monitor from below using 4 screws M6×16.

NOTE

The screws M6×16 needed for attaching the flat-screen monitor to the monitor cart base are contained in the cardboard box with the accessories (→ *Ch. 1.3, p. 1-4*).

- Remove the rear cover of the monitor neck.

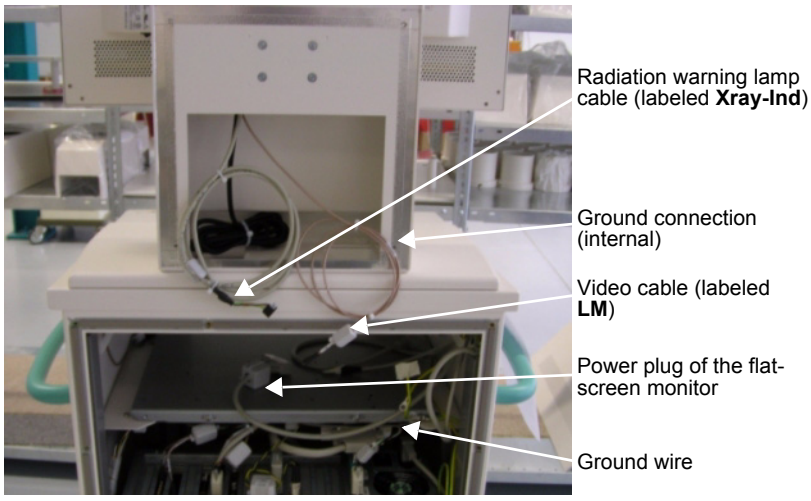

Radiation warning lamp cable (labeled **Xray-Ind**)
Ground connection (internal)
Video cable (labeled **LM**)
Power plug of the flat-screen monitor
Ground wire

Fig. 4-4 Cables inside monitor neck and monitor cart base

- Pull the following cables from the monitor neck down into the monitor cart base:
  - video cables (golden)
  - Radiation warning lamp cable
- Pull the ground wire from the monitor cart base up into the monitor neck.
- Connect the video cables and the radiation warning lamp cable to the image memory module:
  - Video cable: connection labeled **LM**
  - Radiation warning lamp cable: Connection labeled **X-ray Lamp**
- To connect the ground wire to the monitor neck housing, remove nut and washer from the screw, fit the ground wire and washer onto the screw and retighten the nut.

Fig. 4-5 Ground connection inside the monitor neck housing (→ *Fig. 4-4, p. 4-3*)

- Inside the monitor cart base connect the power plug of the flat-screen monitor with the power supply unit for the flat-screen monitors.

Fig. 4-6 23" or 24" flat-screen monitor power plug connected to the power supply unit for the flat-screen monitors

- Reattach the rear cover of the monitor neck.
- Reattach the rear cover of the monitor cart base.

4.1.2 Mounting the 18" flat-screen monitors

NOTICE

NOTICE

Always wear cotton gloves when installing, testing or making settings on displays or screens.

To mount the flat-screen monitors to the monitor cart base, do the following:

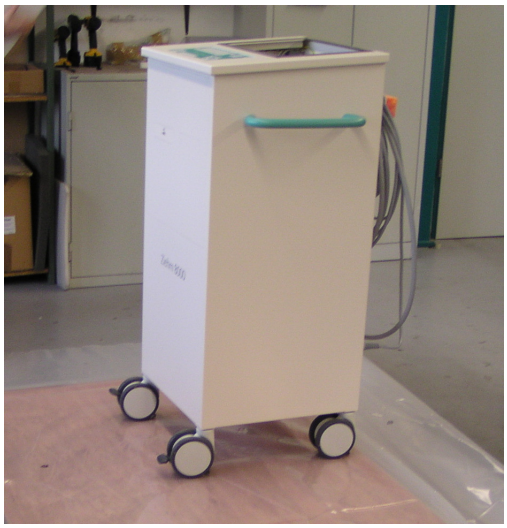


Fig. 4-7 Monitor cart base without flat-screen monitors

Fig. 4-8 Flat-screen monitors on the transport rack

NOTICE

NOTICE

Never place the flat-screen monitors directly on some surface, always place them on the transport rack.

- Remove the rear cover of the monitor cart base.

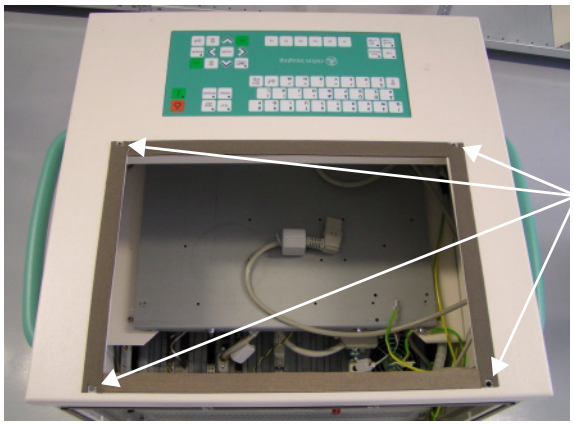


Fig. 4-9 Holes for the four screws M6×16 for attaching the flat-screen monitors to the monitor cart base

- With the help of a second person, lift the flat-screen monitors and place them on the monitor cart base.

WARNING

The flat-screen monitors cannot be lifted by one person alone. Therefore always ask a second person to assist you in placing the monitors on the monitor cart base.

- Attach the flat-screen monitors from below using 4 screws M6×16.

NOTE

The screws M6×16 needed for attaching the flat-screen monitors to the monitor cart base are contained in the cardboard box with the accessories (→ *Ch. 1.3, p. 1-4*).

- Remove the rear cover of the flat-screen monitors. Pull the following cables from the monitor housing down into the monitor cart base:
  - 2 video cables (golden)
  - Radiation warning lamp cable
  - Ground wire

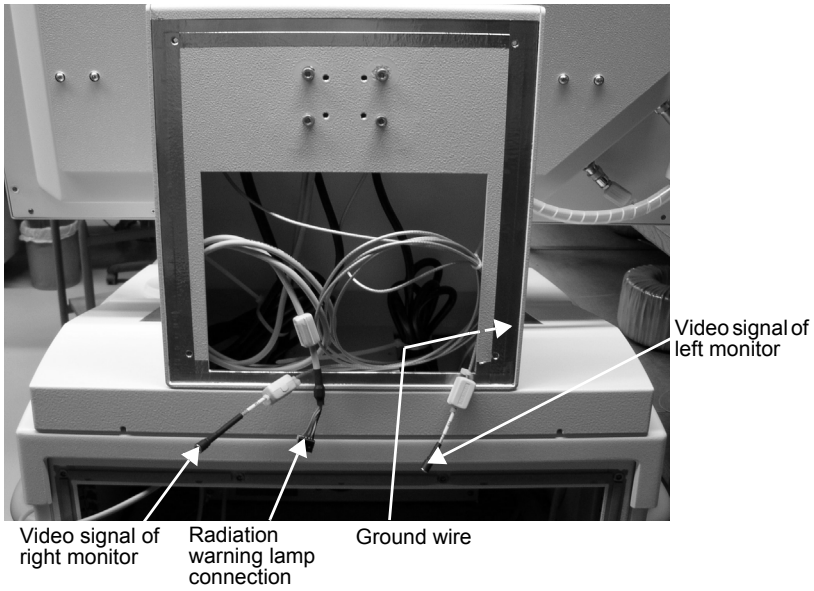


Fig. 4-10 Connections on the flat-screen monitors

- Connect the video cables and the radiation warning lamp cable to the image memory module.
- Connect the power supply units of the flat-screen monitors (right/left) to the corresponding connectors for non-heating devices (labeled RM/ LM) in the monitor cart base.
- To connect the ground wire to the monitor cart base, remove the nut, fit the ground wire onto the screw and retighten the nut.
- Reattach the rear cover of the flat-screen monitors.
- Reattach the rear cover of the monitor cart base.

4.2 Cable connections

Before switching on the system for the first time, or after each transport, you must establish different cable connections.

Ziehm 8000

To establish the cable connections, do the following:

- Unwind the coupling cable from the upper cable support on the back of the monitor cart.
- Plug the coupling cable connector into the socket located at the side of the C-arm stand and lock the connector by pulling the locking lever upward (→ *Fig. 4-11, p. 4-8*).

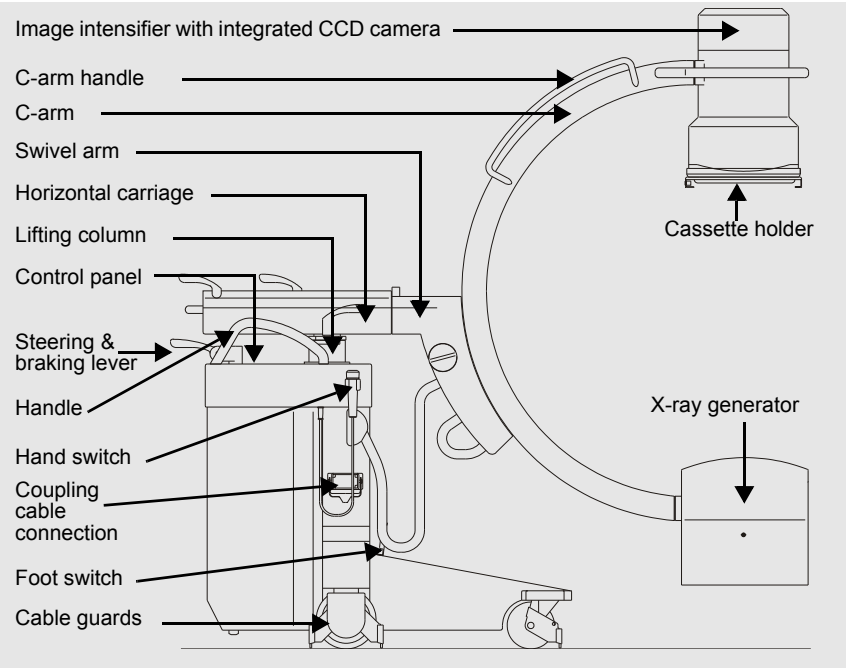


Fig. 4-11 C-arm stand Ziehm 8000

- Make sure that a suitable supply voltage is available and that the socket-outlet is properly grounded and fused.
- Check the power plug on the monitor cart power cable and the socket-outlet for compatibility.
- Connect the system to the power supply.

WARNING

Never connect the monitor cart and C-arm stand when the monitor cart is already connected to the power supply or switched on.

Damage to the electronics of the system cannot be excluded if this warning is ignored!

Ziehm Compact, Ziehm Compact Litho

On a Ziehm Compact or Ziehm Compact Litho, do the following:

- Unwind the power cable from the combined foot switch/power cable support located at the side of the C-arm stand.
- Plug the power cable connector into the socket located at the side of the C-arm stand and lock the connector by pulling the locking lever upward.
- Make sure that a suitable supply voltage is available and that the socket-outlet is properly grounded and fused.
- Check the power plug and the socket-outlet for compatibility.
- Connect the system to the power supply.

4.3 DICOM connection

General

Depending on the system configuration, different technologies are used for connecting the system to the hospital's DICOM network:

- an RJ45 connection (Twisted Pair, 100 Mbit/s)
- a Wireless LAN connection

RJ45 connection

On systems with an RJ45 connection, a network cable runs directly from the network interface card of the image memory module out through the rear cover of the monitor cart and terminates in an RJ45 socket. The system must be connected to the hospital's DICOM network via this socket.

To connect the system to the DICOM network, do the following:

- Connect the RJ45 socket on the back of the monitor cart to a DICOM network socket using the appropriate cable.

Wireless LAN

On systems with Wireless LAN, a transceiver is located at the back of the monitor cart. A second transceiver comes with your accessories and must be connected to the hospital's DICOM network.

To connect the system to the DICOM network, do the following:

- Connect the transceiver included in the accessories to a DICOM network socket.

Ziehm 8000 Workstation

- Connect the DICOM port of the PC Workstation on the back of the monitor cart to another DICOM network socket using the appropriate cable.

5 Putting the System into Service

5.1 Temperature

Room temperature

In case of major differences in temperature, all parts of the system must have reached room temperature before the system is put into service in order to avoid damage to the system as a result of condensation.

WARNING

Do not operate the system until the equipment has reached a safe operating temperature of +15 °C to +35°C with no condensation present.

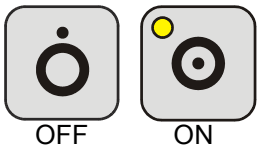
Otherwise severe equipment damage may result.

5.2 First power-up of the system

Preparation

- Make sure that the inclination of the system does not exceed 5° from the level in operating position.
- Ensure that all electrical connections are properly established (→ *Ch. 4.2, p. 4-8*).
- Put on suitable protective clothing.
- Switch on the system.

  You can find an **ON** key and an **OFF** key on the control panels of both the C-arm stand and the monitor cart. Each of the two keys switches on or off both system components simultaneously.



Power-up

During power-up, the system performs a self-test. The value **0** appears on the operating value displays. The **radiation time** display shows the global software version of the system. The **temperature symbol** and the **X-ray symbol** on the C-arm stand control panel light up for a few seconds.

After power-up, a test image appears on the live screen. The default settings after power-up vary from system to system, according to the customer-specific setup.

NOTE

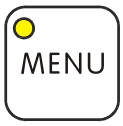
Due to background radiation, the **dose** display on the C-arm stand (if enabled) may indicate some small value after power-up of the system.

To reset the display to zero, press and hold down the **min** key on the C-arm stand control panel for a few seconds.

NOTE

As part of the power-up sequence, the radiation warning lamp may light up. This is a system test and does not mean that radiation is released.

5.3 Setting up the system



After switching on the system for the first time, you can make various customer-specific settings for the system, if this has not already been done at the factory.

Entering the hospital data

As a minimum it is recommended that you enter the relevant hospital data under **Configuration Menu** → **Basic Settings**. This data will then be displayed automatically when you create new patient folders in the **Patient Data Input** menu, eliminating the need to enter it for each new patient.

Further settings

For a detailed description of all other setting options, please refer to → *Ch. 6, p. 6-1*.

6 Configuration

6.1 Overview

General

A large number of parameters can be preset for the Ziehm 8000. This is done in a configuration menu.

To switch between the different menu items, do the following:

- Press the **up arrow** or **down arrow** key until the cursor is on the desired menu item.

To select a setting option, do the following:

- Press the **left arrow** or **right arrow** key until the desired option appears.

or

- Enter the desired value using the alphanumeric keypad on the control panel.

Opening the menu

To open the **Configuration Menu**, you use the **MENU** key on the monitor cart.

The **Configuration Menu** is divided into four submenus:

- Operation settings
- Basic settings
- Monitor settings (only Ziehm 8000 with 23" or 24" flat-screen monitor)
- Service settings

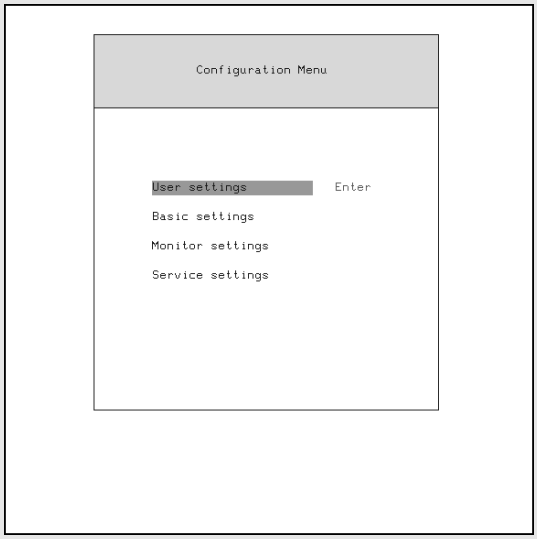


Fig. 6-1 Configuration Menu

6.2 User settings

Function

In the **User Settings** menu, you can make a number of settings which determine the operation conditions during fluoroscopy.

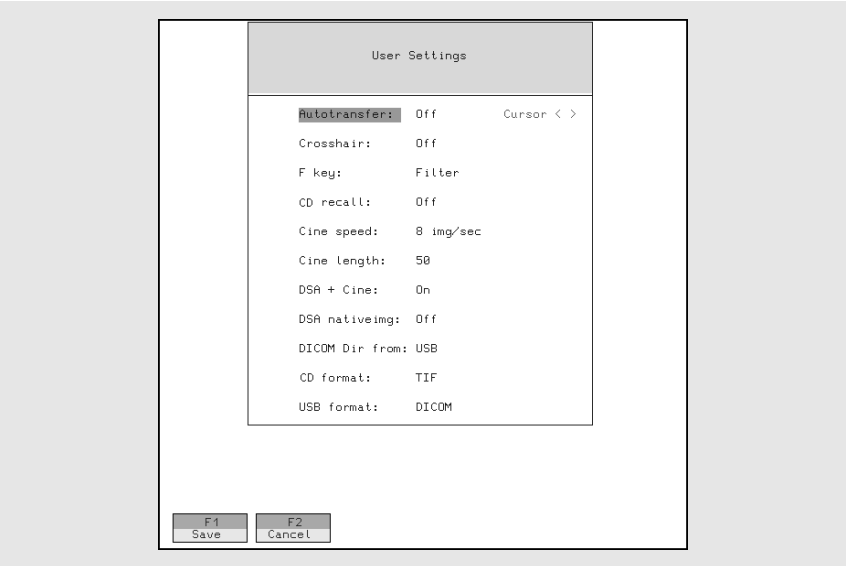


Fig. 6-2 **User Settings** menu

6.2.1 Activating automatic image swapping

Moving the fluoroscopic image

The **Autotransfer** menu item allows you to control whether the previous fluoroscopic image is moved automatically to the reference screen when you next initiate radiation.

- **Autotransfer: Off**

  When you initiate radiation, the previous fluoroscopic image on the live screen is replaced by the new image. If it was unsaved, it will be irretrievably lost.

- **Autotransfer: On**

  When you initiate radiation, the previous fluoroscopic image on the live screen is moved automatically to the reference screen.

  As long as the autotransfer function is active, the LEDs on the **image swapping** keys on the monitor cart and on the C-arm stand are illuminated.

6.2.2 Displaying a crosshair

Positioning aid

The **Crosshair** menu item allows you to control whether a crosshair is displayed as positioning aid (e.g. for foreign body localization) in the center of the live screen image during fluoroscopy. The central point of the crosshair corresponds to the position of the central X-ray beam.

– **Crosshair: On**

  A crosshair appears on the live screen during fluoroscopy.

– **Crosshair: Off**

  No crosshair is displayed on the live screen during fluoroscopy.

NOTE

The **Crosshair On/Off** function can also be assigned to the **F** key on the C-arm stand (→ *Ch. 6.2.3, p. 6-4*).

6.2.3 Function of the F key

Variable assignment

The **F key** menu item allows you to control which function is assigned to the **F** key on the C-arm stand. This enables you to activate the corresponding function directly from the C-arm stand using the **F** key.

The following assignment options are available:

– **Crosshair**

  If you have activated this option, you can show or hide a crosshair as positioning aid in the center of the live screen image with the **F** key (→ *Ch. 6.2.2, p. 6-4*). The central point of the crosshair corresponds to the position of the central X-ray beam.

– **Cine**

  If you have activated this option, you can activate and deactivate the cine loop mode with the **F** key.

– **CO2**

  If you have activated this option, you can activate and deactivate the CO_2 function (together with the DSA subtraction mode) with the **F** key.

– **Filters**

  If you have activated this option, you can reset the recursive filter to level 1 (= 2 images) during fluoroscopy by pressing the **F** key. This will minimize motion blurring (→ *Ch. 6.5.2, p. 6-27*). As long as the recursive filter is reset, the message **Filter off** is displayed on the live screen.

6.2.4 Storage medium for image retrieval

The **CD recall** menu item allows you to control which storage medium is used by the system for data retrieval in the **Mosaic** menu. Data retrieval from CD is subject to certain restrictions.

CD or hard disk

For systems with a CD writer, the following applies:

- **CD recall: Off (default setting)**

  The **Mosaic** menu retrieves the patient folders from the hard disk.

- **CD recall: On**

  The **Mosaic** menu retrieves the patient folders from a CD. For that purpose, you must insert a CD containing backed-up patient folders into the CD writer, which was written using the **Backup** function.

6.2.5 Setting the cine loop speed

Number of frames per second

The **Cine speed** menu item allows you to control the number of frames per second that the system uses for acquisition and playback of a cine loop.

Depending on the system configuration, you can choose between 1, 2, 4, 8, 12.5 or 25 frames per second.

6.2.6 Setting the cine loop length

Total number of images

The **Cine length** menu item allows you to control how many single images (frames) are saved automatically by the system during a cine acquisition run.

You can choose between 50, 100, 150, 200 or 250 images.

6.2.7 Combining DSA with a cine loop

Single image or cine loop with DSA

The **DSA + Cine** menu item allows you to control whether the system automatically acquires a cine loop each time you activate the DSA mode.

- **DSA + Cine: On**

  When you press the **DSA** key on the C-arm stand and then initiate radiation, the system automatically acquires a cine loop after having acquired the DSA mask image.

- **DSA + Cine: Off**

  When you press the **DSA** key on the C-arm stand and then initiate radiation, the system automatically generates a single DSA image.

6.2.8 Showing or hiding the native image

Display native image or not

The **DSA nativeimg** menu item allows you to control whether the native image is displayed or not on the reference screen during generation of a DSA / MSA / RSA image.

- **DSA nativeimg: On**

  When you initiate radiation after injecting the contrast medium, the native image is displayed on the reference screen.

- **DSA nativeimg: Off**

  When you initiate radiation after injecting the contrast medium, no native image is displayed on the reference screen. In this case, you may open a reference image on the reference screen before generating the DSA / MSA / RSA image; this reference image remains displayed there during the entire subtraction procedure.

6.2.9 Selecting the storage medium for data retrieval with DICOM Dir

Storage medium for DICOM Dir

The **DICOM Dir from** menu item allows you to control which storage medium is used by the system for DICOM image retrieval.

- **DICOM Dir from: USB**

  The images are retrieved from the USB stick that is connected to the USB port.

- **DICOM Dir from: CD**

  The images are retrieved from the CD inserted in the CD writer

6.2.10 Defining the storage format for removable storage media

CD storage format

If the system is equipped with a CD writer, the **CD format** menu item allows you to choose a storage format for writing images to CD.

The following options are available:

- TIFF format (for further use on a PC)
- DICOM format (for further use on a DICOM network or viewing with a DICOM viewer)

USB stick storage format

The **USB format** menu item allows you to control which storage format is used for saving images to a USB stick.

The following options are available:

- TIFF format (for further use on a PC)
- DICOM format (for further use on a DICOM network or viewing with a DICOM viewer)

6.3 Basic settings

Function

The **Basic Settings** menu is used for making different settings which directly affect the user interface, e.g. default data for certain menu fields. In addition, you can clear different storage media.

Usually, the options in this menu are set by a service engineer during installation of the system.

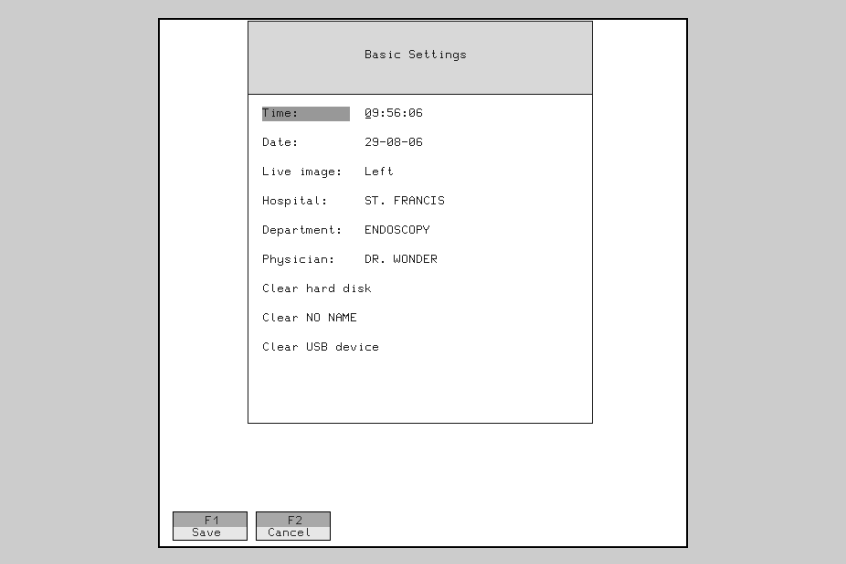


Fig. 6-3 **Basic Settings** menu

6.3.1 Setting the system time and system date

Under the **Time** menu item, the system time (format: hh:mm:ss) must be set once.

Under the **Date** menu item, the system date (format: dd-mm-yy) must be set once.

6.3.2 Selecting the live screen

The **Live image** menu item allows you to choose whether the left or the right screen acts as live screen.

The live screen is the screen where the fluoroscopic image (live or saved) is displayed. The remaining screen then automatically becomes the reference screen.

6.3.3 Entering the hospital data

The **Hospital**, **Department** and **Physician** menu items allow you to define which data appears automatically in the corresponding fields in the **Patient Data Input** menu.

6.3.4 Clearing storage media

When you select one of the menu items **Clear hard disk** or **Clear USB device** and then confirm the clear command with the **Enter** key, all patient data are deleted from the corresponding storage medium after a confirmation prompt.

When you select the **Clear NO NAME** menu item and then confirm the clear command with the **Enter** key, all images in the **NO NAME** folder are deleted.

6.4 Screen settings

6.4.1 Ziehm 8000 with flat-screen monitor

The Ziehm 8000 is equipped with 18", 23" or 24" flat-screen monitors. The 18" flat-screen monitors are delivered as type1 and type 2.

Setting the resolution

The **Monitor Settings** menu is used for adjusting the resolution mode of the 23" or 24" flat-screen monitor.

Further screen settings can be made directly at the displays using a built-in keypad (→ *Ch. 6.4.2, p. 6-10*).

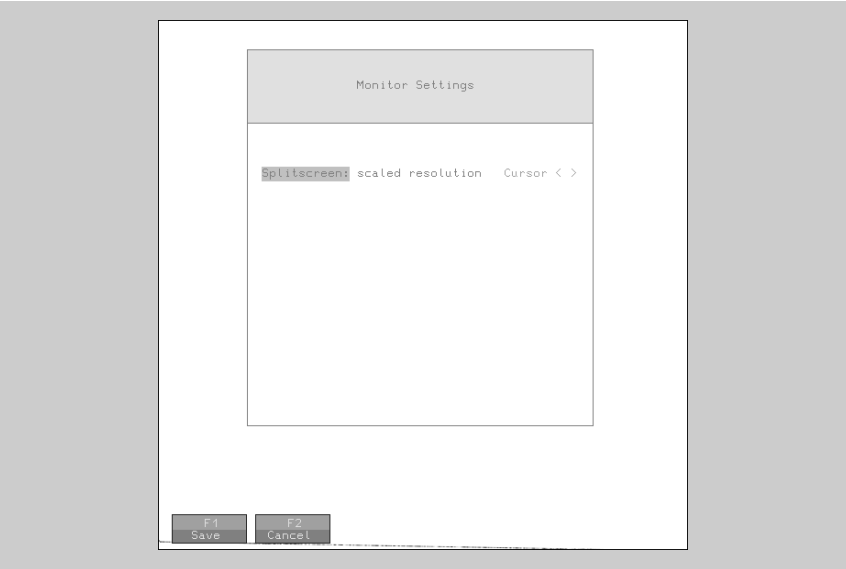


Fig. 6-4 **Monitor Settings** menu on a Ziehm 8000 with 23" or 24" flat-screen monitor

Scaled resolution

When you choose the option **Scaled resolution**, the fluoroscopic images and menus are displayed in the original resolution of the system.

Full size

When you choose the option **Full size**, the fluoroscopic images and menus are displayed so as to completely fill the left or right half of the screen.

6.4.2 Setting flat-screen monitors of type 1

Safety measures

NOTICE

NOTICE

The system may only be set up and put into service by service engineers who are authorized by the manufacturer.

If service is needed, the system may only be repaired by authorized service engineers.

WARNING

WARNING

When the system is opened, there is a risk of electric shock. The system may only be opened by qualified service personnel.

To prevent fire or electric shock, the system must not be exposed to rain or moisture.

The system must not be operated next to flammable anesthetic gas mixtures of air, oxygen and nitrogen oxides.

Screen settings

On systems with flat-screen monitors, the screen settings are made directly at the monitors using a built-in keypad.

You can change the following screen settings yourself:

- Brightness
- Contrast
- Backlight
- Menu language for screen settings
- Video source (*Inputs*)
- Gamma
- Display settings (*Picture*), e.g. horizontal and vertical position, sharpness, scaling
- Menu setup (*Setup*), e.g. menu lock

In addition, you can restore the factory settings.

The factory-set menu language is English. Therefore, the English designations are used in this document.

6.4.2.1 Built-in keypad

Each flat-screen monitor has a built-in keypad with six keys, which are used for accessing the screen setting menus.

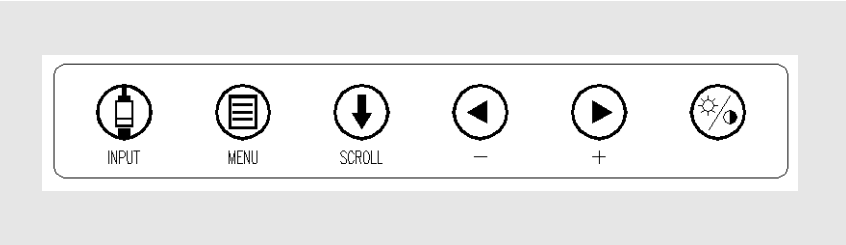
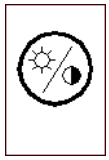


Fig. 6-5 Built-in keypad of the flat-screen monitor

6.4.2.2 Setting the brightness, contrast and backlight

To set the screen brightness, do the following:

Brightness



- Press the **Brightness/Contrast** key.
  The **Brightness** control appears on the screen.

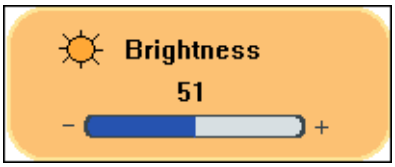


Fig. 6-6 The **Brightness** control on a 18" or 23" flat-screen monitor

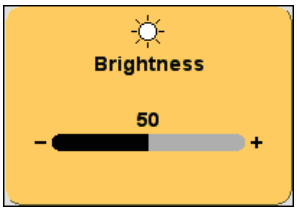
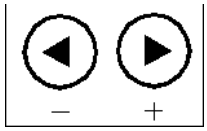


Fig. 6-7 The **Brightness** control on a 24" flat-screen monitor



- Press the **+** or **–** arrow key to increase or decrease the screen brightness.
  The settings become immediately active on the screen. After a few seconds, the **Backlight Brightness** control disappears automatically.

Contrast

To set the screen contrast, do the following:

- Press the **Brightness/Contrast** key twice.
  The **Contrast** control appears on the screen.

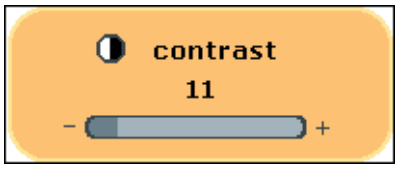


Fig. 6-8 The **Contrast** control on a 18" or 23" flat-screen monitor

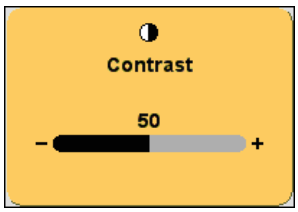
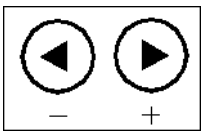


Fig. 6-9 The **Contrast** control on a 24" flat-screen monitor

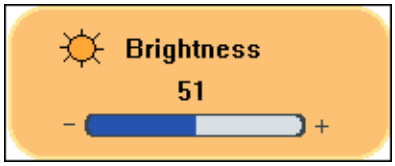


- Press the **+** or **–** arrow key to increase or decrease the contrast.
  The settings become immediately active on the screen. After a few seconds, the **Contrast** control disappears automatically.

Backlight

To set the screen backlight brightness, do the following:

- Press the **Brightness/Contrast** key three times.
  The **Brightness** or **Backlight Brightness** control appears on the screen.



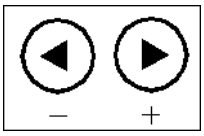


Fig. 6-10 The **Brightness** control on a 18" or 23" flat-screen monitor

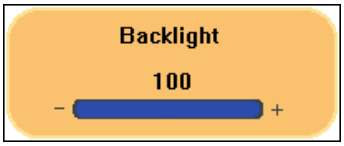


Fig. 6-11 The **Brightness** control on a 24" flat-screen monitor

- Press the **+** or **–** arrow key to increase or decrease the backlight.
  The settings become immediately active on the screen. After a few seconds, the **Backlight** or **Backlight Brightness** control disappears automatically.

NOTE

Lowering the backlight level will increase the backlight lifetime.

6.4.2.3 Setting the menu language

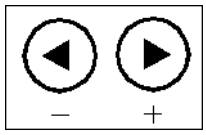
The factory-set menu language is English. You can choose one of the following languages as menu language:

- German
- French
- Italian
- Spanish
- Dutch
- Swedish

To define the menu language, do the following:

- Press the **MENU** key.
  The on-screen menu appears.

- Select the **Setup** tab with the help of the **+** or **–** arrow keys.



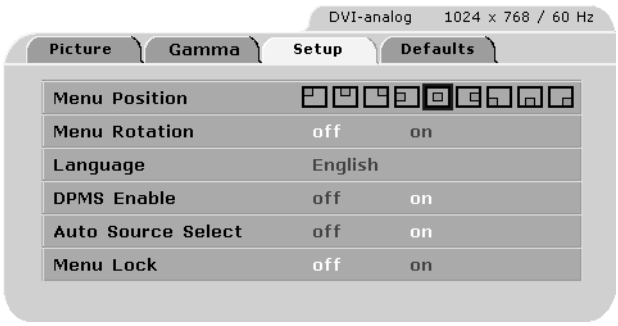


Fig. 6-12 The **Setup** control on a 18" or 23" flat-screen monitor

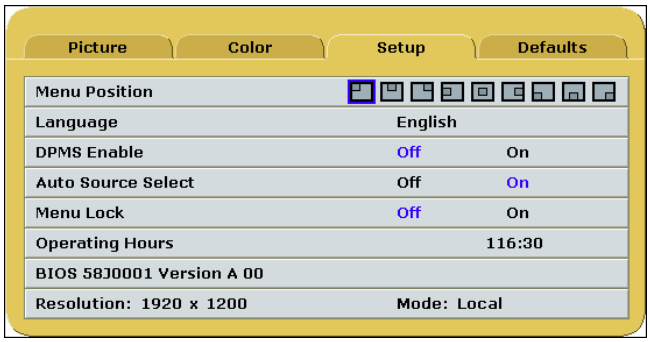
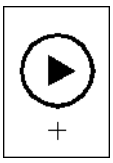


Fig. 6-13 The **Configuration** control on a 24" flat-screen monitor

- Move to the **Language** item with the help of the **SCROLL** key.



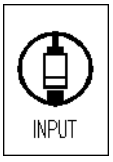
- Press the **+** arrow key until the desired language is displayed.
  All on-screen menu elements and controls are displayed immediately in the chosen language.

- Press the **MENU** key.
  The on-screen menu disappears.

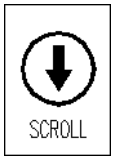
6.4.2.4 Setting the video source

18" or 23" flat-screen monitor

To set the video source on the 18" or 23" flat-screen monitor, do the following:

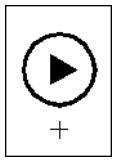


- Press the **Input** key.
  The **Inputs** on-screen menu with the following options appears:
  - DVI – analog
  - BNC
  - DVI – digital

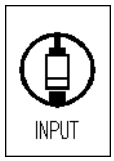


- Press the **SCROLL** key until the desired item is highlighted.

- Press the **+** arrow key.
  The highlighted item is marked as **selected**.



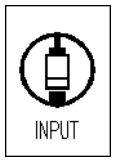
- Press the **Input** key.
  The **Inputs** on-screen menu disappears.



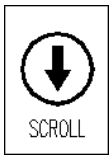
To set the video source on the 24" flat-screen monitor, do the following:

24" flat-screen monitor

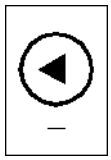
- Press the **Input** key.
  The **Inputs** on-screen menu with the following options appears:
  - DVI (graphic input)
  - SOG (video input)



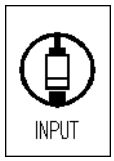
- Press the **SCROLL** key until the desired item is highlighted.



- Press the **Minus** button.
  The highlighted item is marked as **selected**.



- Press the **Input** key.
  The **Inputs** on-screen menu disappears.



6.4.2.5 Setting the gamma value

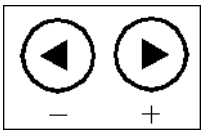
The gamma value determines the contrast between the lightest and the darkest point of the screen display.

The **Gamma** tab furthermore shows the backlight operating hours clocked up so far and the BIOS version of the monitor.

18" or 23" flat-screen monitor

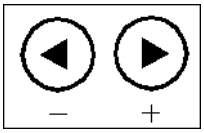
To set the gamma value on the 18" or 23" flat-screen monitor, do the following:

- Press the **MENU** key.
  The on-screen menu appears.



- Select the **Gamma** tab with the help of the **+** or **–** arrow keys.
  On the **Gamma** tab, the following gamma value options are available:
  - 1,5
  - 1,7
  - 2,2
  - 2,6
  - 3,0

- Press the **SCROLL** key until the desired value is highlighted in white.



- Press the **+** or **–** arrow key.
  The desired value is set.

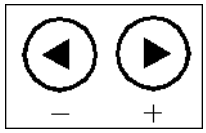
- Press the **MENU** key.
  The on-screen menu disappears.

24" flat-screen monitor

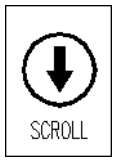
To set the gamma value on the 24" flat-screen monitor, do the following:

- Press the **MENU** key.
  The on-screen menu appears.

- Select the **Defaults** tab with the help of the **+** or **–** arrow keys.



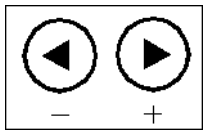
- Press the **SCROLL** key until the **Gamma** item is highlighted.



- Press the **+** or **–** arrow key until the desired parameter value is selected.

  On the **Gamma** tab, the following gamma value options are available:

  – 1,8
  – 2,0
  – 2,2
  – 2,4
  – 2,6



- Press the **MENU** key.

  The on-screen menu disappears.

6.4.2.6 Setting up the display

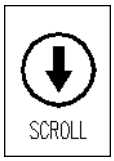
To set up the display, do the following:

- Press the **MENU** key.

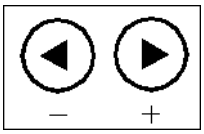
  The on-screen menu with the **Picture** tab displayed on top appears.

  Depending on the set video source (→ *Ch. 6.4.2.4, p. 6-14*), the **Picture** tab shows the following items as a maximum:

  – **Horizontal Position**
  – **Vertical Position**
  – **Sharpness**
  – **Phase**
  – **Frequency**
  – **Overscan** (24" flat-screen monitor only)
  – **Scaling** (23" flat-screen monitor only)
  – (24" flat-screen monitor only)
  – **SmartSync**



- Press the **SCROLL** key until the desired item is highlighted.



- Press the **+** or **–** arrow key until the desired setting is displayed or marked as selected.
  The desired value is set.
- Repeat these two steps for any further parameter you want to set.
- Press the **MENU** key.
  The on-screen menu disappears.

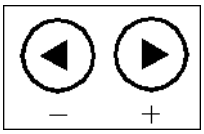
6.4.2.7 Setting up the menu

On the **Setup** tab you can make different settings that affect the menu display. In addition, you may lock the menu (→ *Ch. 6.4.2.8, p. 6-19*) and select the menu language (→ *Ch. 6.4.2.3, p. 6-13*).

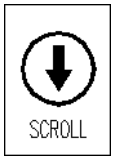
The **Configuration** tab on the 24" flat-screen monitor furthermore shows the backlight operating hours clocked up so far and the BIOS version of the monitor.

To make the basic menu settings, do the following:

- Press the **MENU** key.
  The on-screen menu appears.



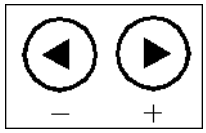
- Select the **Setup** tab with the help of the **+** or **–** arrow keys.
  On the **Setup or Configuration** tab, the following controls are available:
  - **Position** menu
  - **Language** (→ *Ch. 6.4.2.3, p. 6-13*)
  - **DPMS Enable** (23" flat-screen monitor only)
  - DPMS Enable (24" flat-screen monitor only)
  - **Auto Source Select**
  - **Lock** menu (→ *Ch. 6.4.2.8, p. 6-19*)



- Press the **SCROLL** key until the desired item is highlighted.

- Press the **+** or **–** arrow key until the desired parameter value is selected.

  The desired parameter value is set.



- Repeat these two steps for any further parameter you want to set.
- Press the **MENU** key.

  The on-screen menu disappears.

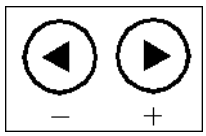
6.4.2.8 Locking the menu

To disable access to the menu system, do the following:

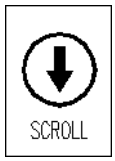
- Press the **MENU** key.

  The on-screen menu appears.

- Select the **Setup** tab with the help of the **+** or **–** arrow keys.



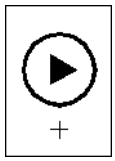
- Press the **SCROLL** key until the **Lock** menu item is highlighted.



- Press the **+** arrow key.

  The menu disappears. The message MENU LOCKED is displayed.

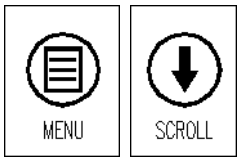
  As long as the menu is disabled, the message MENU LOCKED is displayed whenever you press one of the keys on the keypad.



To re-enable the menu display, do the following:

- Simultaneously press the **MENU** and **Scroll** keys.

  A message saying that the menu is unlocked is displayed. When you press one of the keys on the keypad, the corresponding on-screen menu appears.

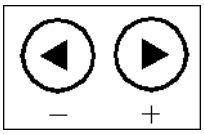


6.4.2.9 Restoring the factory settings

After having changed the screen settings, you may restore the factory-set values at any time.

To restore the factory settings, do the following:

- Press the **MENU** key.
  The on-screen menu appears.



- Select the **Defaults** tab with the help of the **+** or **–** arrow keys.

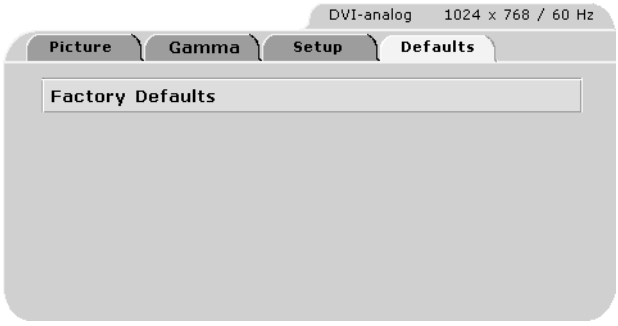


Fig. 6-14 The **Defaults** control on a 18" or 23" flat-screen monitor

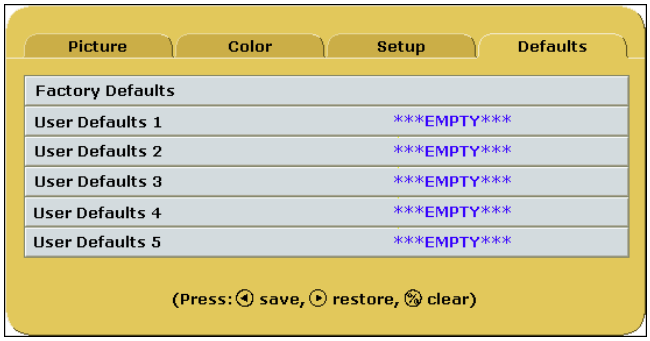
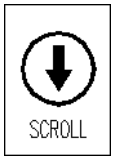
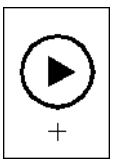


Fig. 6-15 The **Configuration** control on a 24" flat-screen monitor



- Press the **Scroll** key.
  The **Factory Defaults** menu item is selected.



- Press the **+** arrow key.
  The on-screen menu disappears. All settings are reset to the factory values.

6.4.3 Setting flat-screen monitors of type 2

NOTE

The menu display for setting the brightness and contrast is not locked. Do not change the values in order to ensure optimum display settings.

Fig. 6-16 Flat-screen monitors of type 2

Safety measures

NOTICE

The system may only be set up and put into service by service engineers who are authorized by the manufacturer.

If service is needed, the system may only be repaired by authorized service engineers.

WARNING

When the system is opened, there is a risk of electric shock. The system may only be opened by qualified service personnel.

To prevent fire or electric shock, the system must not be exposed to rain or moisture.

The system must not be operated next to flammable anesthetic gas mixtures of air, oxygen and nitrogen oxides.

Built-in keypad

Each flat-screen monitor has a built-in keypad with four keys, which are used for accessing the screen setting menus.

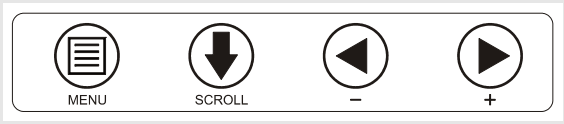
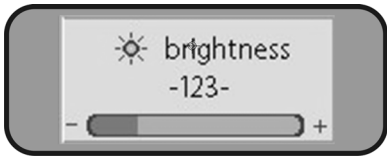


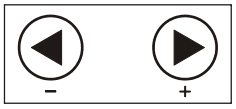
Fig. 6-17 Built-in keypad of the flat-screen monitor

Brightness

To set the screen brightness, do the following:

- Press the **SCROLL** key.
  The **Brightness** control appears on the screen.



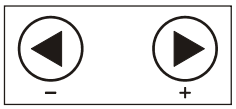


- Press the **+** or **–** arrow key to increase or decrease the screen brightness.
  The settings become immediately active on the screen. After a few seconds, the **Backlight Brightness** control disappears automatically.

Contrast

To set the screen contrast, do the following:

- Press the **SCROLL** key twice.
  The **Contrast** control appears on the screen.



- Press the **+** or **–** arrow key to increase or decrease the contrast.
  The settings become immediately active on the screen. After a few seconds, the **Contrast** control disappears automatically.

To set the screen backlight brightness, do the following:

Backlight brightness

- Press the key sequence **MENU**, **SCROLL**, **MENU**.
  The OSD (Onscreen Display) appears on the screen.

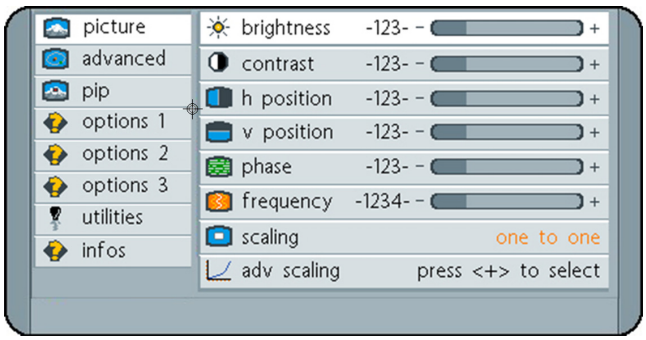
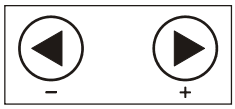


Fig. 6-18 Onscreen Display (flat-screen monitor)

- Press the **SCROLL** key three times.
  The **options 1** submenu is highlighted in white.

- Press the **MENU** key.
  The first function in the **options 1** submenu is selected.

- Press the **SCROLL** key three times.
  The **Backlight cd/m²** function is selected.



- Press the **+** or **–** arrow key to increase or decrease the backlight brightness.
  The settings become immediately active on the screen. After a few seconds, the control disappears automatically.

NOTE

Lowering the backlight level will increase the backlight lifetime.

Setting the menu language

The factory-set menu language is English. Alternatively, you can choose German as the menu language:

To define the menu language, do the following:

- Press the key sequence **MENU**, **SCROLL**, **MENU**.
  The OSD (Onscreen Display) (→ *Fig. 6-18, p. 6-23*) appears on the screen.

- Press the **SCROLL** key six times.
  The **utilities** submenu is highlighted in white.

- Press the **MENU** key.
  The first function in the **utilities** submenu is selected.

- Press the **SCROLL** key until the desired language is displayed.
  All on-screen menu elements and controls are displayed immediately in the chosen language. After a few seconds, the control disappears automatically.

Restoring the factory settings

After having changed the screen settings, you may restore the factory-set values at any time.

To restore the factory settings, do the following:

- Press the key sequence **MENU**, **SCROLL**, **MENU**.
  The OSD (Onscreen Display) (→ *Fig. 6-18, p. 6-23*) appears on the screen.

- Press the **SCROLL** key six times.
  The **utilities** submenu is highlighted in white.

- Press the **MENU** key.
  The first function in the **utilities** submenu is selected.

- Press the **SCROLL** key three times.
  The **Factory reset** function is selected.

- Press the **+** arrow key.
  All settings are reset to the factory values.

6.5 Service settings

Function

The **Service Settings** menu is used for modifying different system parameters which affect both the quality of the fluoroscopic image and the user interface.

Password

The **Service Settings** menu is password-protected. If you are an authorized person, you can obtain the password from your local Ziehm dealer.

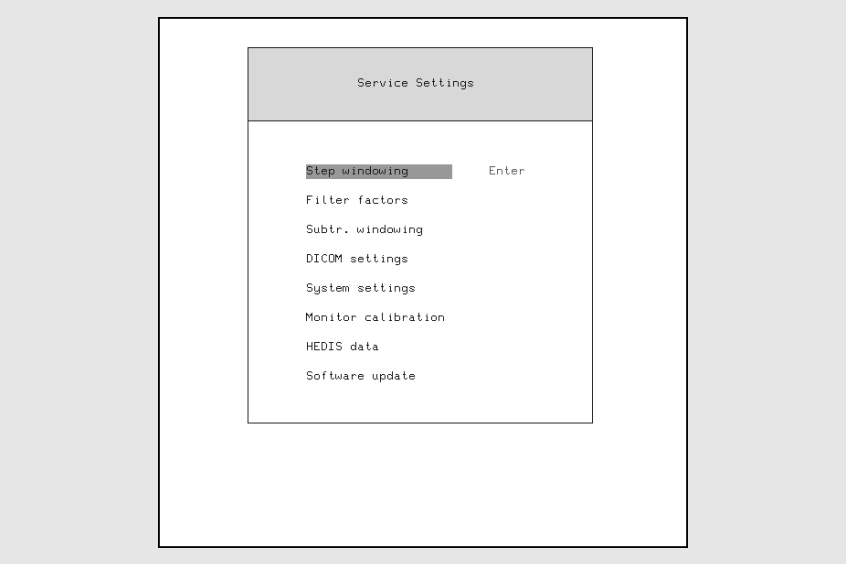


Fig. 6-19 **Service Settings** menu

6.5.1 Step windowing

Function

The **Step Windowing** menu is used for presetting 4 fixed steps for the contrast window level (**L**) and width (**W**). During fluoroscopy, you can select these steps with the **contrast** keys on the C-arm stand.

NOTE

For the subtraction modes, no step windowing is available.

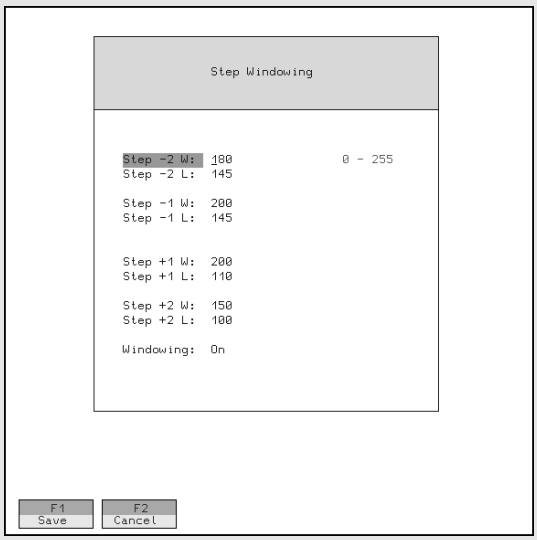


Fig. 6-20 **Step Windowing** menu

Parameter range

The available parameter range (0–255) is displayed as soon as the menu item is selected with the **down arrow** or **up arrow** key. The desired values must be entered with the alphanumeric keys.

Activating the step windowing mode

The **Windowing** menu item is used for setting either standard windowing mode or step windowing mode for the **contrast** keys on the C-arm stand.

– **Windowing: Off**

  The **contrast** keys on the C-arm stand work in standard windowing mode.

– **Windowing: On**

  The **contrast** keys on the C-arm stand work in step windowing mode.

Default setting

The default windowing steps which are activated after power-up can be programmed for each individual anatomical program under **Configuration Menu** → **Service Settings** → **Filter Factors** → **Organ 0** / **Organ 1** / **Organ 2** / **Soft** (→ *Ch. 6.5.2.1, p. 6-28*).

6.5.2 Filter factors

Function

The **Filter Factors** submenu is used for setting different filter factors for each anatomical program and each subtraction mode in separate submenus.

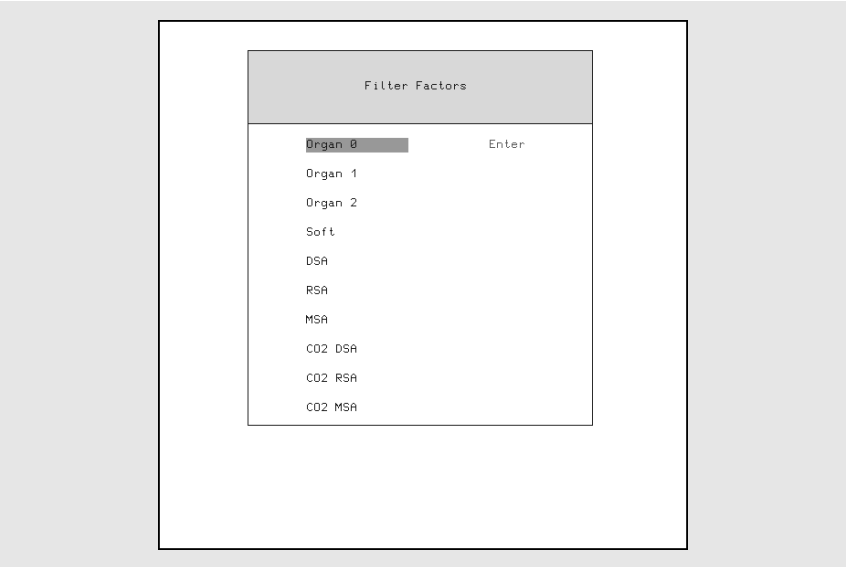


Fig. 6-21 **Filter Factors** menu

Menu item	**Anatomical program**
Organ 0 = **extremities & children**	
Organ 1 = **head, spine & pelvis**	
Organ 2 = **thorax & abdomen**	

Table 6-1 Anatomical programs

6.5.2.1 Filters for anatomical programs

Filter types

For each of the anatomical programs **Organ 0**, **Organ 1**, **Organ 2** and **Soft**, the values for the following filters can be programmed:

- Recursive filter for continuous fluoroscopy

  (independent settings for normal view, magnification 1 and magnification 2)
- Stack filter for continuous fluoroscopy
- Edge filter
- Default windowing step after power-up
- Stack filter for continuous pulse fluoroscopy
- Stack filter for snapshot

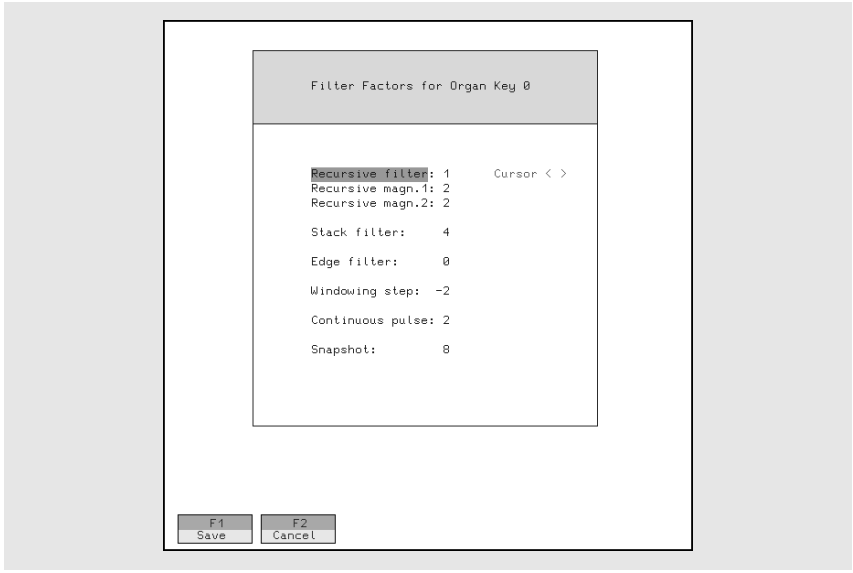


Fig. 6-22 **Filter Factors for Organ Key 0** menu

Parameter values

The following parameter values can be set:

Filter type	Fluoroscopy mode	Available parameters
Recursive filter	Continuous fluoroscopy	Level 0, 1, 2, 3 (= 1, 2, 4, 8 images)
Stack filter	Continuous fluoroscopy	1, 2, 4, 8, 16 images
Edge filter	Continuous fluoroscopy, continuous pulse fluoroscopy, Snapshot	Level 1, 2, 0, 3, 4

Table 6-2 Filters for anatomical programs

Filter type	Fluoroscopy mode	Available parameters
Windowing step	Continuous fluoroscopy, continuous pulse fluoroscopy, Snapshot	Level -2, -1, 0, +1, +2
Continuous pulse	Continuous pulse fluoroscopy (= stack filter)	1, 2, 4, 8, 16 images
Snapshot	Snapshot (= stack filter)	1, 2, 4, 8, 16 images

Table 6-2 Filters for anatomical programs (cont.)

Recursive filter

The **recursive filter** adds the preset number of images during fluoroscopy, whereby each newly-acquired image is superimposed by the result of the previous addition with a certain weighting factor. The higher the preset number of images, the greater the noise suppression, but also the greater motion blurring.

The values can be set independently for normal view, magnification 1 and magnification 2.

Stack filter

The **stack filter** generates and adds the preset number of images after radiation has been terminated. The higher the preset number of images, the greater the noise suppression, but also the greater motion blurring if the patient moves during image generation.

Edge filter

The **edge filter** is used for setting a greater or lesser degree of enhancement (sharpening) of edges within the image. 4 levels of edge enhancement are available:

Level	Meaning
0	No edge enhancement (original fluoroscopic image)
1	Slight edge enhancement
2	Medium edge enhancement
3	Strong edge enhancement
4	Extreme edge enhancement

Table 6-3 Edge filter levels

Increasing the level of edge enhancement will also cause any noise in the image to become more apparent, though.

Windowing step This value determines which windowing step is automatically set by the system for the corresponding anatomical program after power-up, provided that the step windowing mode has been activated (→ *Ch. 6.5.1, p. 6-26*).

You can adjust these default settings later during operation using the **contrast** keys on the C-arm stand.

Continuous pulse This setting defines how many images are used for the stack filter in **continuous pulse fluoroscopy** mode (overriding the value specified under **Stack filter**).

Snapshot This setting defines how many images are used for the stack filter in **snapshot** mode (overriding the value specified under **Stack filter**).

6.5.2.2 Filters for subtraction modes

Filter types For each of the subtraction modes **DSA**, **RSA** and **MSA**, the values for the following filters can be programmed:

- Recursive filter

  (independent settings for normal view, magnification 1 and magnification 2)
- Stack filter
- Edge filter

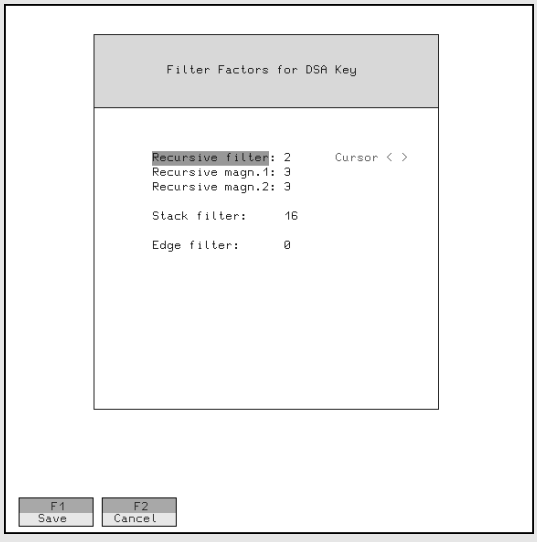


Fig. 6-23 **Filter Factors for DSA Key** menu

The following parameter values can be set:

Parameter values

Filter type	Fluoroscopy mode	Available parameters
Recursive filter	Continuous fluoroscopy	Level 0, 1, 2, 3 (= 1, 2, 4, 8 images)
Stack filter	Continuous fluoroscopy	1, 2, 4, 8, 16 images
Edge filter	Continuous fluoroscopy, continuous pulse fluoroscopy, Snapshot	Level 1, 2, 0, 3, 4

Table 6-4 Filters for subtraction modes

6.5.2.3 Filters for subtraction modes with CO_2

Filter types

If the system is equipped with the CO_2 option, the values for the following filters can be selected for each of the subtraction modes **DSA**, **RSA** and **MSA** in combination with **CO2** negative contrast medium:

- Recursive filter

  (independent settings for normal view, magnification 1 and magnification 2)
- Stack filter
- Edge filter

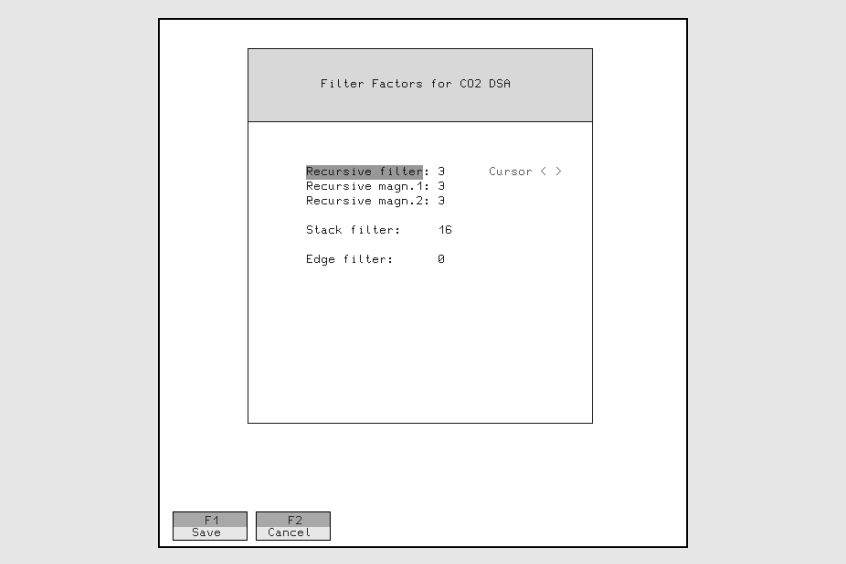


Fig. 6-24 **Filter Factors for CO2 DSA** menu

Parameter values The following parameter values can be set:

Filter type	Fluoroscopy mode	Available parameters
Recursive filter	Continuous fluoroscopy	Level 0, 1, 2, 3 (= 1, 2, 4, 8 images)
Stack filter	Continuous fluoroscopy	1, 2, 4, 8, 16 images
Edge filter	Continuous fluoroscopy, continuous pulse fluoroscopy, Snapshot	Level 1, 2, 0, 3, 4

Table 6-5 Filters for subtraction modes with CO_2

6.5.3 Windowing settings for subtraction modes

Function This menu is used for setting default values for the width (**W**) and level (**L**) of the contrast window. This is done separately for **DSA**, **MSA** and **RSA**.

If the system is equipped with the CO_2 option, the default windowing values for each individual subtraction mode in combination with CO_2 can be set in addition.

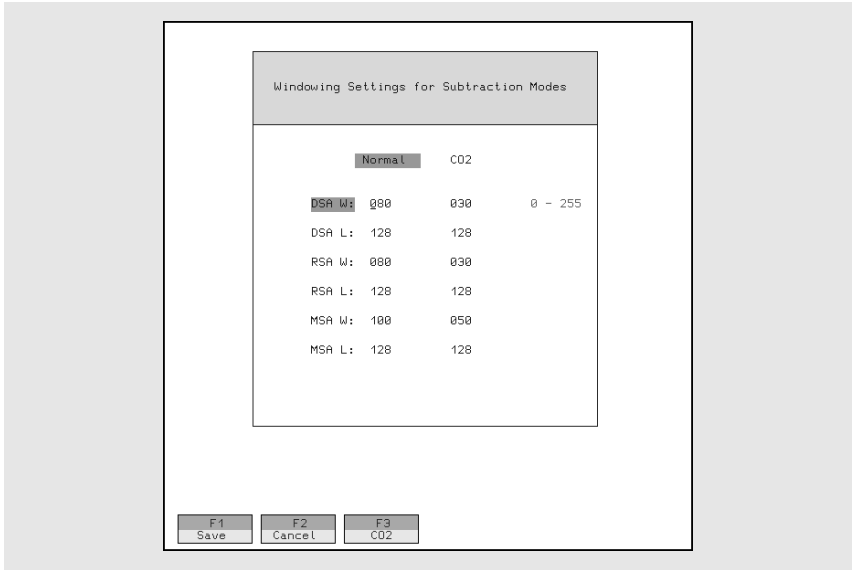
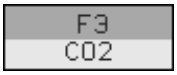


Fig. 6-25 **Windowing Settings for Subtraction Modes** menu

Parameter range The available parameter range (0–255) is displayed as soon as the menu item is selected with the **down arrow** or **up arrow** key. The desired values must be entered with the alphanumeric keys.



Function key **F3 – CO2** moves the cursor to the column where the default windowing values for the subtraction modes with CO_2 negative contrast medium are set.

Function key **F3 – Normal** returns the cursor to the column where the default windowing values for the subtraction modes with positive contrast medium are set.

6.5.4 DICOM settings

CAUTION

The settings in this menu must not be modified by any person other than an authorized service engineer or a properly trained network administrator.

This menu is protected by an additional password. If you are an authorized person, you can obtain the password from your local Ziehm dealer.

6.5.4.1 Network parameters

To enable the system to establish a connection for a DICOM data transfer, you must specify the following network parameters:

- **IP addr. DICOM server** (IP = Internet Protocol)

  Each host on the network is assigned an IP address consisting of a 32-bit number, e.g. 192.168.127.080 (192.168.127 = group address, .080 = individual host)

  IP address ranges (examples, other configurations are possible):

  - Class A network: 10.0.0.0 to 10.255.255.255
  - Class B network: 128.16.0.0 to 172.31.255.255
  - Class C network: 192.168.0.0 to 192.168.255.255

- **IP subnet mask**

  255.255.255.0 (subnet mask, combined with IP address yields group address, see above)

  IP address ranges (examples, other configurations are possible):

  - Class A network: 255.0.0.0
  - Class B network: 255.255.0.0
  - Class C network: 255.255.255.0

- **Host name DICOM server**

  Name of the network host, e.g. **sun-server**, with unique IP address assignment

- **AE title DICOM server** (**A**pplication **E**ntity = name of the application)

  Name of the DICOM application on the server, e.g. **INOARCHIVE** for DICOM Storage

– **Port addr. DICOM server**

  At this address, the server “listens” for requests from Ziehm NetPort.

– **IP address gateway**

  If the server and Ziehm NetPort belong to different groups, a gateway must be specified, e.g. 192.168.127.254.

– **IP address ZiehmNetPort (IP address of Ziehm 8000)**

– **AE title ZiehmNetPort (AE title of Ziehm NetPort, freely configurable)**

The **DICOM Verification** function enables you to check whether all parameters have been entered correctly (error messages → *Ch. 6.5.4.7, p. 6-51*). The default port address for DICOM is set to **104** and cannot be reconfigured.

Entering special characters

In some lines of the network parameter input screen, you may enter certain special characters. Function keys **F4 – <** and **F5 – >** appear in this case. A list of the available special characters is displayed above these two function keys. As long as you hold down one of these two function keys, the available special keys are displayed one after the other in the order of the list. With **F4 – <** you can scroll forward in the list. With **F5 – >** you can scroll backward in the list.

6.5.4.2 Configuration of Storage and Storage Commitment

Storage information model

When configuring the storage server, you specify not only the general network parameters (→ *Ch. 6.5.4.1, p. 6-33*), but also the storage information model (**SOP class** = Service Object Pair). You can choose between the following options:

– **XA** = X-ray Angiography

– **CR** = Computed Radiography

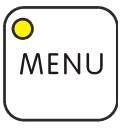
– **SC** = Secondary Capture

The original images furnished by Ziehm NetPort are of type **XA**. Since some servers do not support the **XA** SOP class, **CR** and **SC** are provided as alternatives.

Image attributes

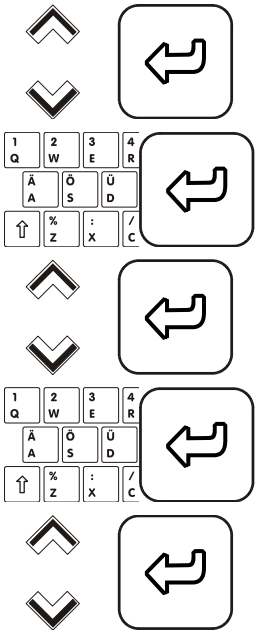
Under **Image attributes included** you define which HEDIS filter algorithms are applied to the DICOM image prior to transfer. By default, all attributes are set to **Off**, and the raw image is transferred.

To configure the storage server, do the following:



- Press the **MENU** key.
  The **Configuration Menu** appears.

- Select the **Service settings** menu item.



- Type the password and press the **Enter** key.
- Select the **DICOM settings** menu item.
- Type the password and press the **Enter** key.
- Select the **Storage server** menu item.
  The **DICOM Settings Storage Server** menu appears.

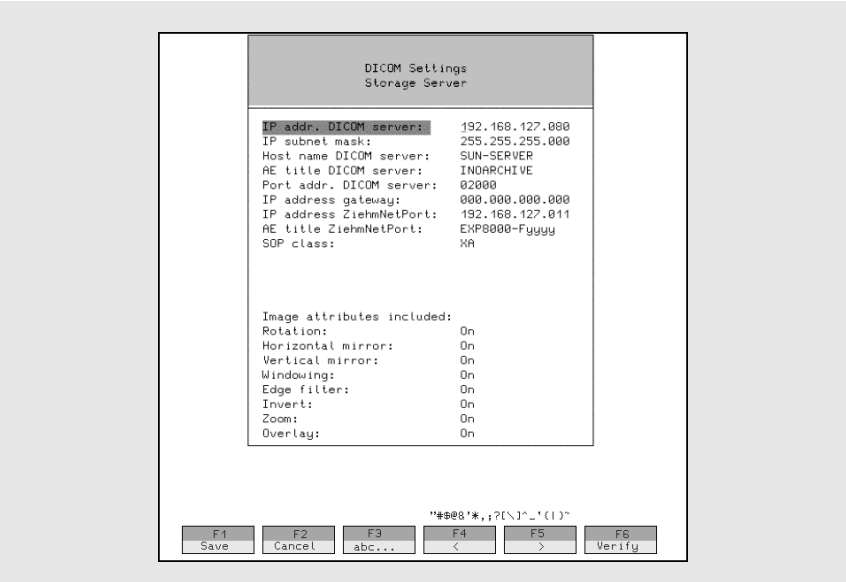
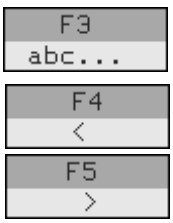


Fig. 6-26 **DICOM Settings Storage Server** menu

- Enter the network parameters.
  When the cursor is in certain lines of the input screen, additional function keys for entering lower case letters and special characters are displayed.
- To enter lower case letters, press key **F3 – abc...**



- To enter a special character, press and hold down key **F4 – <** or **F5 – >** until the desired special character appears.
- Activate or deactivate the desired image attributes.

- Press key **F6 – Verify**.

  The system checks the network connection between SCU (Service Class User = Ziehm NetPort) and SCP (Service Class Provider = server) by means of a “ping”, the DICOM settings (e.g. AE title) and common SOP classes (“association negotiation”). It sends an ECHO request to the SCP and waits for an ECHO response.

  If all network parameters have been entered correctly, the message **Verification successful** is displayed (error messages → *Ch. 6.5.4.7, p. 6-51*).

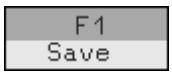
  If your system includes the **Storage Commitment** function, the following message is displayed:

  Do you want to activate NetCommit? Y/N

- Press the **Y** key if you want to activate the **Storage Commitment** function.

or

- Press the **N** key if you do not want to activate the **Storage Commitment** function.



- Press key **F1 – Save**.

6.5.4.3 Configuration of Media Storage

Storage information model

When configuring the storage server, you specify not only the general network parameters (→ *Ch. 6.5.4.1, p. 6-33*), but also the storage information model (**SOP class** = Service Object Pair). You can choose between the following options:

- **XA** = X-ray Angiography
- **CR** = Computed Radiography
- **SC** = Secondary Capture

The original images furnished by Ziehm NetPort are of type **XA**. Since some servers do not support the **XA** SOP class, **CR** and **SC** are provided as alternatives.

Image attributes

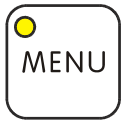
Under **Image attributes included** you define which HEDIS filter algorithms are applied to the DICOM image prior to saving. By default, all attributes are set to **Off**, and the raw image is saved.

DICOM storage format

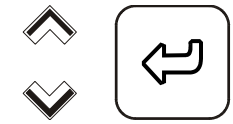
The **DICOM** format must have been set as storage format for writing images to USB stick or CD (→ *Ch. 6.2.10, p. 6-6*).

To configure Media Storage, do the following:

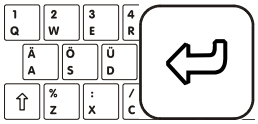
- Press the **MENU** key.
  The **Configuration Menu** appears.



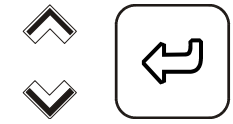
- Select the **Service settings** menu item.



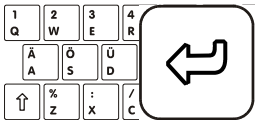
- Type the password and press the **Enter** key.



- Select the **DICOM settings** menu item.



- Type the password and press the **Enter** key.



- Select the **Media storage** menu item.
  The **DICOM Settings Media Storage** menu appears.

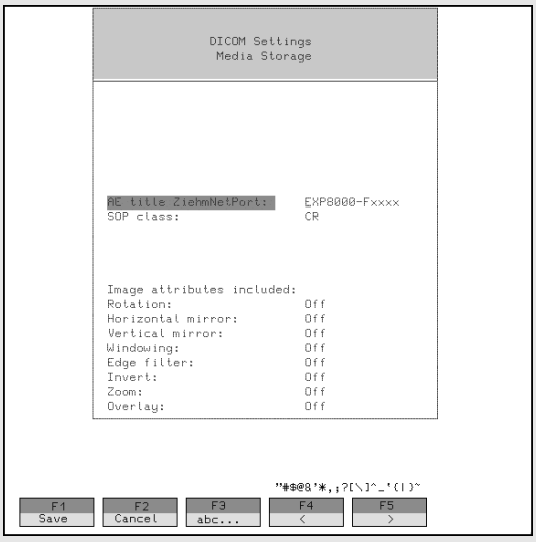
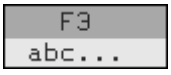


Fig. 6-27 **DICOM Settings Media Storage** menu

- Enter the **AE title** and the **SOP class**.
  When the cursor is in certain lines of the input screen, additional function keys for entering lower case letters and special characters are displayed.
- To enter lower case letters, press key **F3 – abc...**



- To enter a special character, press and hold down key **F4 – <** or **F5 – >** until the desired special character appears.
- Activate or deactivate the desired image attributes.
- Press key **F1 – Save**.

6.5.4.4 Configuration of DICOM Query/Retrieve

Query model

When configuring the query/retrieve server, you specify not only the general network parameters (→ *Ch. 6.5.4.1, p. 6-33*), but also the **query model**:

– **PATIENT ROOT**: Patient-level data

– **STUDY ROOT**: Study-level data

NOTE

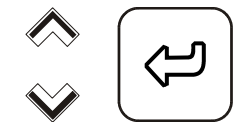
If several patients with the same patient ID are stored in the PACS, you will get the patient with the respective ID who is sent by the PACS first.

Network parameters for Retrieve

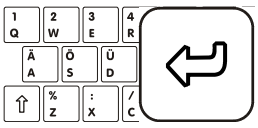
To enable Ziehm NetPort to connect to the Query server for the **Retrieve** function, you must enter its AE title, IP address as well as port **104**. Use the same **IP address** and **AE title** as in the **DICOM Settings Query Server** menu (→ *Fig. 6-28, p. 6-39*).

To configure the query server, do the following:

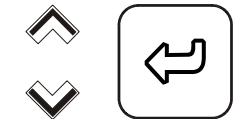
- Press the **MENU** key.
  The **Configuration Menu** appears.



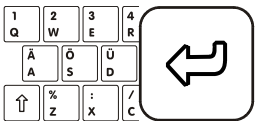
- Select the **Service settings** menu item.



- Type the password and press the **Enter** key.

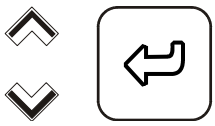


- Select the **DICOM settings** menu item.



- Type the password and press the **Enter** key.

- Select the **Query server** menu item.
  The **DICOM Settings Query Server** menu appears.



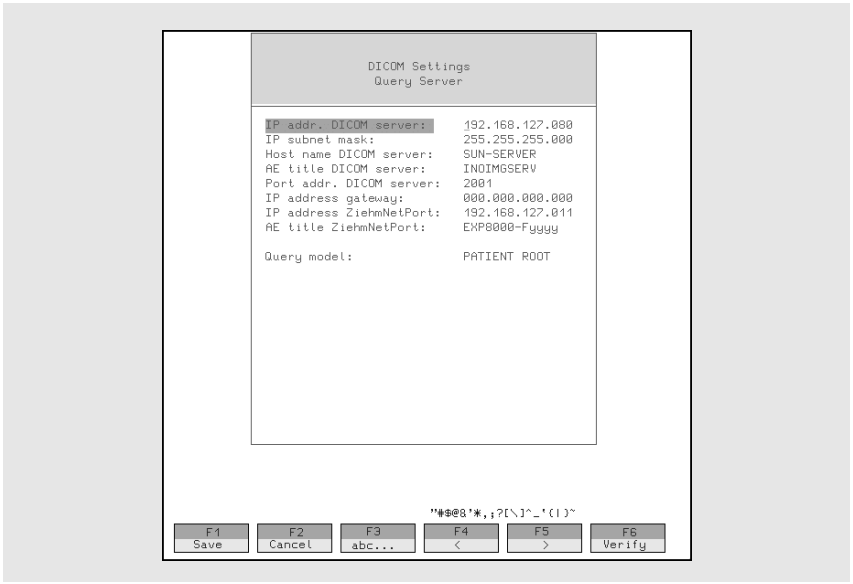
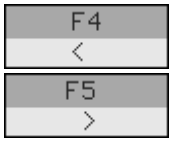


Fig. 6-28 **DICOM Settings Query Server** menu

- Enter the network parameters.
  When the cursor is in certain lines of the input screen, additional function keys for entering lower case letters and special characters are displayed.
- To enter lower case letters, press key **F3 – abc...**

- To enter a special character, press and hold down key **F4 – <** or **F5 – >** until the desired special character appears.



- Press key **F6 – Verify**.
  The system checks the network connection between SCU and SCP by means of a “ping”, the DICOM settings (e.g. AE title) and common SOP classes (“association negotiation”). It sends an ECHO request to the SCP and waits for an ECHO response.
  If all network parameters have been entered correctly, the message **Verification successful** is displayed (error messages → *Ch. 6.5.4.7, p. 6-51*).

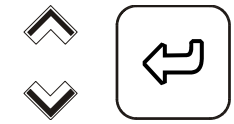
Retrieve server

The retrieve server settings are entered in the **DICOM Settings Retrieve Server X** menu.

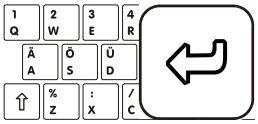
If any requested images cannot be found on the query server, Ziehm NetPort will automatically select the appropriate retrieve server using the retrieve AE title (which is provided by the query server).

To configure a retrieve server, do the following:

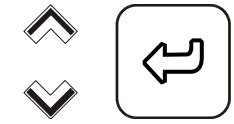
- Press the **MENU** key.
  The **Configuration Menu** appears.



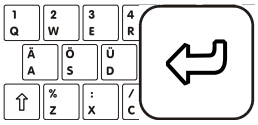
- Select the **Service settings** menu item.



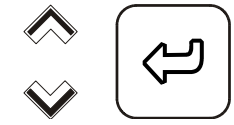
- Type the password and press the **Enter** key.



- Select the **DICOM settings** menu item.



- Type the password and press the **Enter** key.



- Select the **Query server** menu item.
  The **DICOM Settings Query Server** menu appears.

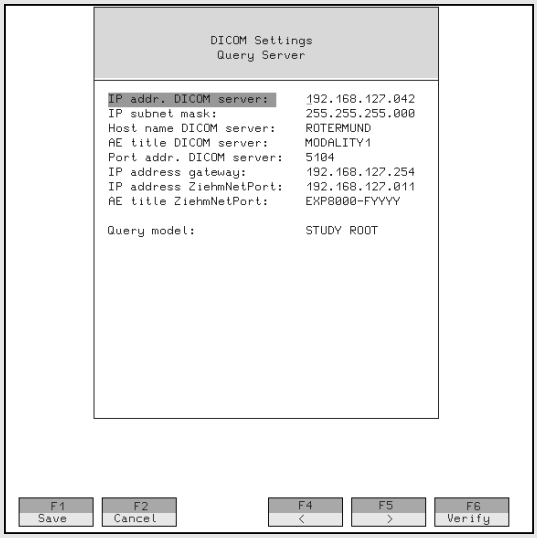


Fig. 6-29 **DICOM Settings Query Server** menu

- Place the cursor on the **IP addr. DICOM server** menu item.

- Press key **F4 – <** or **F5 – >**.

  The **DICOM Settings Retrieve Server** menu for the selected retrieve server (**1** or **2**) is displayed.

or

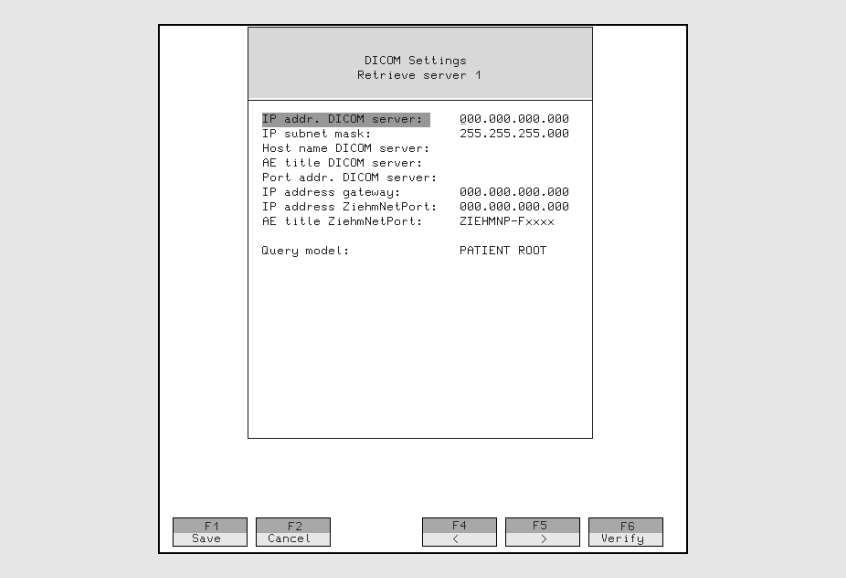


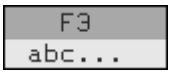
Fig. 6-30 **DICOM Settings Retrieve Server** menu (here: Retrieve Server 1)

- Enter the network parameters.

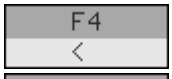
  The Gateway, IP address Ziehm NetPort and AE title Ziehm NetPort settings must be identical to the corresponding query server settings.

  When the cursor is in certain lines of the input screen, additional function keys for entering lower case letters and special characters are displayed.

- To enter lower case letters, press key **F3 – abc...**



- To enter a special character, press and hold down key **F4 – <** or **F5 – >** until the desired special character appears.



- Press key **F6 – Verify**.

  The system checks the network connection between SCU and SCP by means of a “ping”, the DICOM settings (e.g. AE title) and common SOP classes (“association negotiation”). It sends an ECHO request to the SCP and waits for an ECHO response.

  If all network parameters have been entered correctly, the message **Verification successful** is displayed (error messages → *Ch. 6.5.4.7, p. 6-51*).

6.5.4.5 Configuration of Worklist and MPPS

Search arguments for Worklist Server

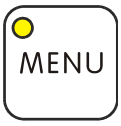
When configuring the worklist server, you specify not only the general network parameters (→ *Ch. 6.5.4.1, p. 6-33*), but also one or several search arguments:

- **Modality**: You can limit the Worklist to images of the **XA** or **CR** SOP class (→ *p. 6-34*)
- **Station AE title**: You can limit the Worklist to jobs that are assigned to the **AE title ZiehmNetPort** specified (= **YES**; **NO** = no limitation)
- **Time span**: The default setting for the time span is **0 – 24** o'clock of the current day. You may set a shorter period of time (full hours only).
- **Location**: You can limit the Worklist to jobs that are related to the location of the respective Ziehm NetPort, e.g. **OR 1**.

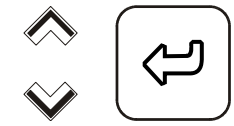
Operator's name

In addition, you must enter the name of the radiological technologist under **Operator's Name**.

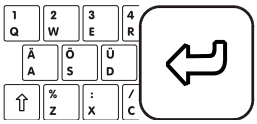
To configure the worklist server, do the following:



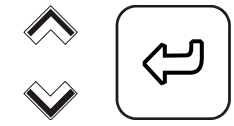
- Press the **MENU** key.
  The **Configuration Menu** appears.



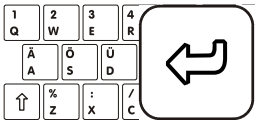
- Select the **Service settings** menu item.



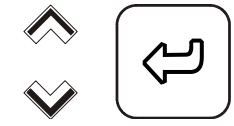
- Type the password and press the **Enter** key.



- Select the **DICOM settings** menu item.



- Type the password and press the **Enter** key.



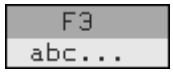
- Select the **Worklist server** menu item.
  The **DICOM Settings Worklist Server** menu appears.

Fig. 6-31 **DICOM Settings Worklist Server** menu

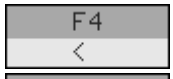
- Enter the network parameters.

  When the cursor is in certain lines of the input screen, additional function keys for entering lower case letters and special characters are displayed.

- To enter lower case letters, press key **F3 – abc...**



- To enter a special character, press and hold down key **F4 – <** or **F5 – >** until the desired special character appears.



- Enter the desired search arguments.

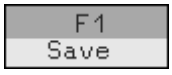
- Enter the name of the radiological technologist under **Operator's Name**.

- Press key **F6 – Verify**.

  The system checks the network connection between SCU and SCP by means of a "ping", the DICOM settings (e.g. AE title) and common SOP classes ("association negotiation"). It sends an ECHO request to the SCP and waits for an ECHO response.

  If all network parameters have been entered correctly, the message **Verification successful** is displayed (error messages → *Ch. 6.5.4.7, p. 6-51*).

- Press key **F1 – Save**.

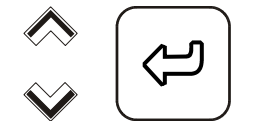


MPPS Server

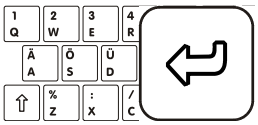
When configuring the MPPS server, you specify only the general network parameters (→ *Ch. 6.5.4.1, p. 6-33*). The search arguments are irrelevant for the MPPS server.

To configure the MPPS server, do the following:

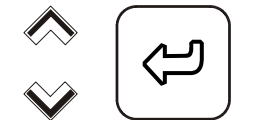
- Press the **MENU** key.
  The **Configuration Menu** appears.



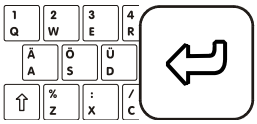
- Select the **Service settings** menu item.



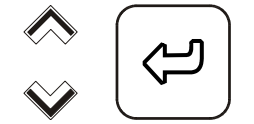
- Type the password and press the **Enter** key.



- Select the **DICOM settings** menu item.



- Type the password and press the **Enter** key.



- Select the **Worklist server** menu item.
  The **DICOM Settings Worklist Server** menu appears.

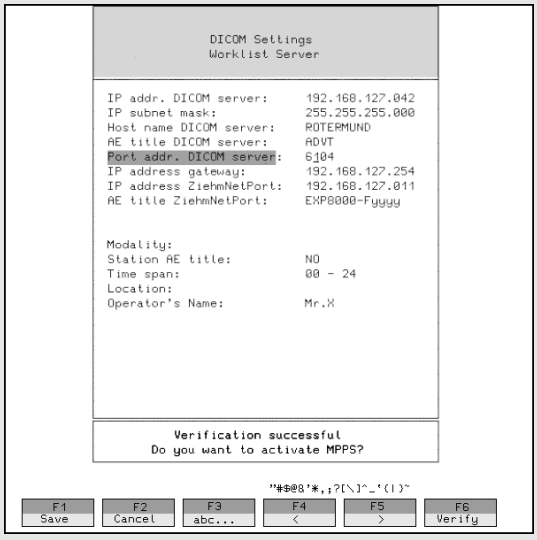


Fig. 6-32 **DICOM Settings Worklist Server** menu

- Place the cursor on the **IP addr. DICOM server** menu item.

- Press key **F5 – >**.
  The **DICOM Settings MPPS Server** menu appears.

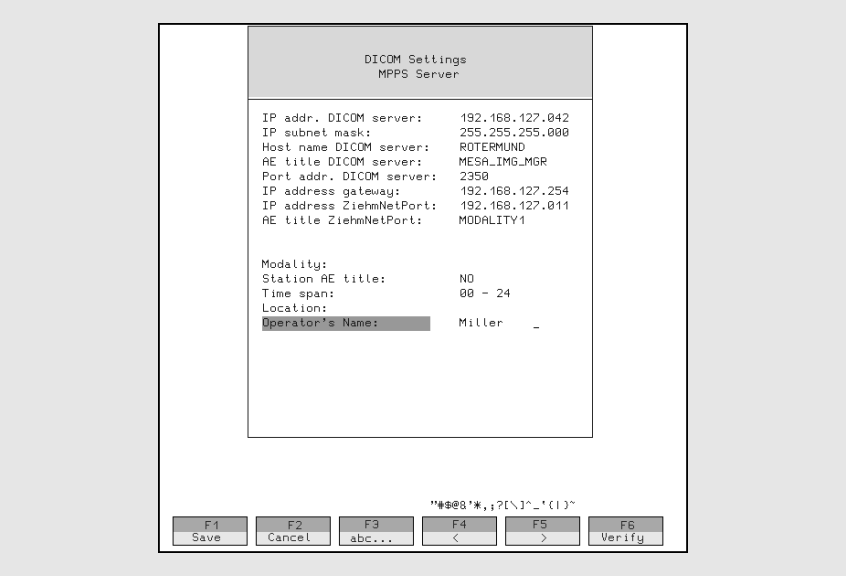
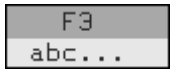


Fig. 6-33 **DICOM Settings MPPS Server** menu

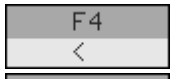
- Enter the network parameters.

- Enter the name of the radiological technologist under **Operator's Name**.
  When the cursor is in certain lines of the input screen, additional function keys for entering lower case letters and special characters are displayed.

- To enter lower case letters, press key **F3 – abc...**



- To enter a special character, press and hold down key **F4 – <** or **F5 – >** until the desired special character appears.



- Press key **F6 – Verify**.
  The system checks the network connection between SCU and SCP by means of a "ping", the DICOM settings (e.g. AE title) and common SOP classes ("association negotiation"). It sends an ECHO request to the SCP and waits for an ECHO response.

  If all network parameters have been entered correctly, the message **Verification successful** is displayed (error messages → *Ch. 6.5.4.7, p. 6-51*).

  If the connection has been successfully established, the following message appears:

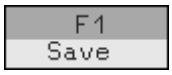
  Do you want to activate MPPS? Y/N

- Press the **Y** key if you want to activate the **MPPS** function.

or

- Press the **N** key if you do not want to activate the **MPPS** function.

If the system was unable to establish a connection, the MPPS function is automatically deactivated.



- Press key **F1 – Save**.

Returning to the Worklist server configuration

To return from the DICOM Settings MPPS Server menu to the DICOM Settings Worklist Server menu, do the following:

- In the **DICOM Settings MPPS Server** menu, place the cursor on the **IP addr. DICOM server** menu item.

- Press key **F4 – <**.
  The **DICOM Settings Worklist Server** menu appears.

6.5.4.6 Configuration of the print servers

Two print servers

You can configure two print servers if you wish. Print server 1 can be configured to perform one of the following functions:

- **Print** = DICOM Print
- **Navigation**
- **Storage2** = DICOM Store

Print server 2 can only be configured for the **Print** function.

Additional parameters

When configuring the print server, you specify not only the general network parameters (→ *Ch. 6.5.4.1, p. 6-33*), but also the following additional parameters:

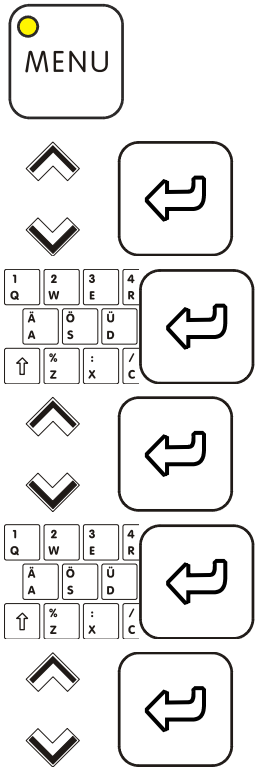
- **Number of copies**: Here you define the number of hard copies (default setting: **1**; setting options: **1–10**).
- **Print priority**: Here you may define a certain priority for the print jobs (default setting: none; setting options: **HIGH**, **MED**, **LOW**).
- **Medium type**: Here you may define a certain printer medium (default setting: none; setting options: **PAPER**, **CLEAR FILM**, **BLUE FILM**).
- **Film destination**: Here you may define a certain output tray for the printed film, according to its intended use (default setting: none; setting options: **MAGAZINE**, **PROCESSOR**, **BIN_1**, **BIN_2** ... **BIN_9**).
- **Film session label**: Here you may enter any text for labeling the film (default setting: none).

- **Film size ID**: Here you may specify the film size (default setting: none; setting options: **8INX10IN**, **8_5INX11IN**, **10INX12IN**, **10INX14IN**, **11INX14IN**, **11INX17IN**, **14INX14IN**, **14INX17IN**, **24CMX24CM**, **24CMX30CM**, **A4**, **A3**)
- **Number / Page**: Here you may specify how many images you want to print on one page (default setting: **1**, setting options: **1**, **2**, **4**, **6**, **9**, **12**, **15**, **20**, **24**)
- **Min. Density** or **Max. Density**: Here you define the desired minimum or maximum print density (default setting: none, setting options **0** ... **65535**).
- **User Configuration**: Here you define whether an additional dialog for making the print settings is displayed or not when the user selects the **DICOM Print** function (default setting: **Off**; setting options: **Off**, **On**).
- **Function**: Here you define which function is assigned to function key **F5 – NetOutput** in the **Mosaic** menu, **Output** submenu (default setting: **Print**; setting options: **Print** = **DICOM Print**, **Storage2** = **DICOM Store**; **Navigation** = **Navigation** for Brainlab)

  Print Server 2: Only the **Print** = **DICOM Print** function is available.

To configure print server 1, do the following:

Configuring print server 1



- Press the **MENU** key.
  The **Configuration Menu** appears.
- Select the **Service settings** menu item.
- Type the password and press the **Enter** key.
- Select the **DICOM settings** menu item.
- Type the password and press the **Enter** key.
- Select the **Print server** menu item.
  The **DICOM Settings Print Server 1** menu appears.

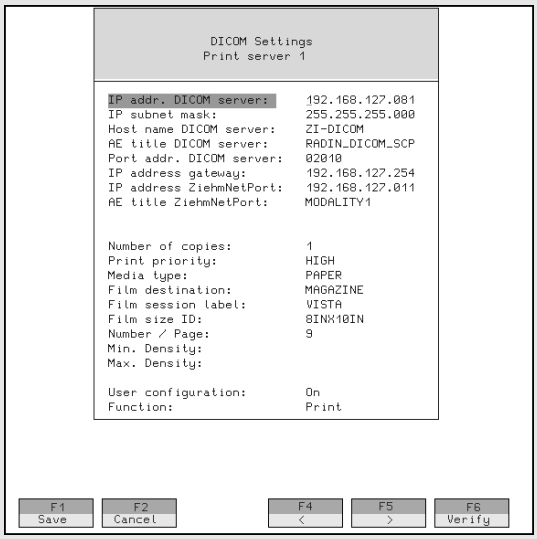
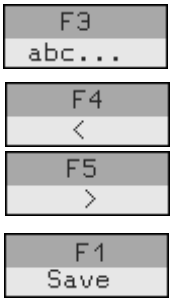


Fig. 6-34 **DICOM Settings Print Server 1** menu

- Enter the network parameters.

  When the cursor is in certain lines of the input screen, additional function keys for entering lower case letters and special characters are displayed.

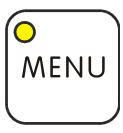


- To enter lower case letters, press key **F3 – abc...**
- To enter a special character, press and hold down key **F4 – <** or **F5 – >** until the desired special character appears.
- Specify the print configuration parameters.

- Press key **F1 – Save**.

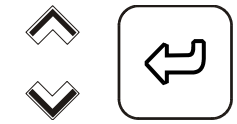
Configuring print server 2

To configure print server 2, do the following:

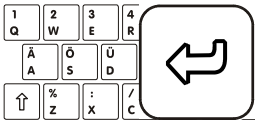


- Press the **MENU** key.

  The **Configuration Menu** appears.

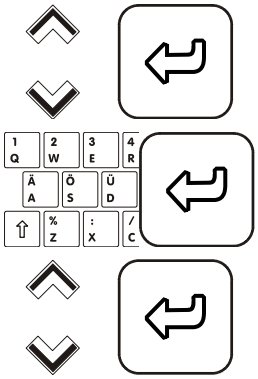


- Select the **Service settings** menu item.



- Type the password and press the **Enter** key.

- Select the **DICOM settings** menu item.



- Type the password and press the **Enter** key.

- Select the **Print server** menu item.
  The **DICOM Settings Print Server 1** menu appears.

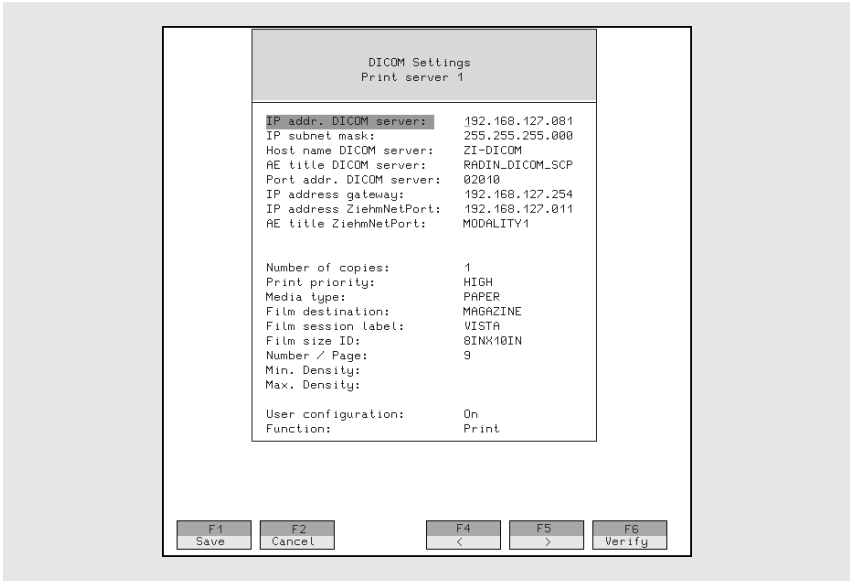
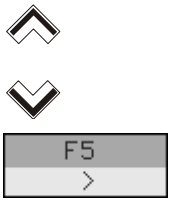


Fig. 6-35 **DICOM Settings Print Server 1** menu

- Place the cursor on the **IP addr. DICOM server** menu item.



- Press key **F5 – >**.
  The **DICOM Settings Print Server 2** menu appears.

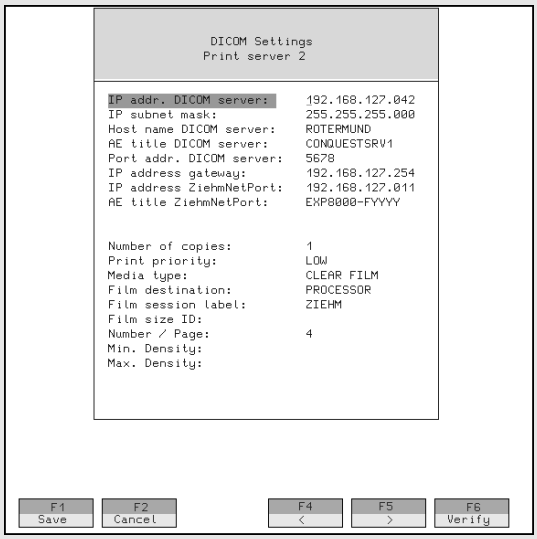
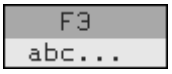


Fig. 6-36 **DICOM Settings Print Server 2** menu

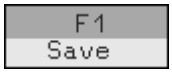
- Enter the network parameters.

  When the cursor is in certain lines of the input screen, additional function keys for entering lower case letters and special characters are displayed.



- To enter lower case letters, press key **F3 – abc...**

- To enter a special character, press and hold down key **F4 – <** or **F5 – >** until the desired special character appears.
- Specify the print configuration parameters.



- Press key **F1 – Save**.

Returning to the print server 1 configuration

To return from the DICOM Settings Print Server 2 menu to the DICOM Settings Print Server 1 menu, do the following:

- In the **DICOM Settings Print Server 2** menu, place the cursor on the **IP addr. DICOM server** menu item.

- Press key **F4 – <**.

  The **DICOM Settings Print Server 1** menu appears.

6.5.4.7 DICOM Verification error messages

The **DICOM Verification** function enables you to check whether all parameters have been entered correctly. If the verification procedure is not successful, one of the following error messages is displayed:

Error message	Cause(s)
No connection to server (is displayed in the respective interface language)	Server is missing or not switched on, or wrong IP address.
PC/TCP resident module is not loaded; aborting program up to SW 15: **No connection to server**	Network interface card driver is not loaded PCTCP in autoexec.bat is not set
Failed to connect to remote host [v5] up to SW 15: **No connection to server**	Server is not switched on IP address of DICOM server is wrong IP subnet mask is wrong
Unable to resolve host name to ip address [v5] up to SW 15: **No connection to server**	Host name of DICOM server is wrong
Association negotiation failed [v5] up to SW 15: **SYSTEM ERROR 23**	AE title of DICOM server is wrong Port address of DICOM server is wrong AE title of Ziehm NetPort is wrong (when trying to connect to the server) no common SOP classes (mergecom.app)
Connection aborted before association negotiation was completed [v5] up to SW 15: **No response from server**	Port address of DICOM server does not exist Application on the server is not running
Required Configuration Info Missing [v5] up to SW 15: **No response from server**	Wrong mergecom.app
MERGE.INI file cannot be located [v1] up to SW 15: **SYSTEM ERROR 3**	Entry in autoexec.bat is missing
(Communication takes too long (> 20 s))	dicom\pctcp\pctcpsrv.drv file is incompatible

Table 6-6 DICOM Verification error messages

Error message	Cause(s)
Network unexpectedly shutdown [v11]	Server does not send an ECHO response, but association negotiation is okay
Message service unacceptable for this association [v8]	Wrong mergecom.app STANDARD_ECHO is missing
Timed out waiting on network partner [v11]	Server does not recognize ECHO request or STANDARD_ECHO service It may be necessary to restart the server (e.g. HIPAX server)
Network partner sent an invalid message [v11]	Server does not recognize ECHO request or STANDARD_ECHO service It may be necessary to restart the server (e.g. HIPAX server)

Table 6-6 DICOM Verification error messages (cont.)

6.5.4.8 DICOM Retrieve error messages

The following error messages frequently occur at user level:

Response from server	Cause(s)
0xa801	Ziehm NetPort is not properly connected to the server: wrong network settings
0xC000, 0xC001	Ziehm NetPort is not properly connected to the server: wrong DICOM settings, or image data is not stored on the query server

Table 6-7 DICOM Retrieve error messages

6.5.4.9 Hardware with DICOM option

There are two hardware versions:

- an RJ45 connection (Twisted Pair, 100 Mbit/s)
- Fiber-optic connection (FOC): ST coupling, 10base-FL or 100base-FX

RJ45 connection

On systems with an RJ45 connection, a network cable runs directly from the network interface card of the image memory module out through the rear cover of the monitor cart and terminates in an RJ45 socket. The system must be connected to the hospital network via this socket.

FO connection

On systems with a fiber optic connection, a network cable runs to a fiber optic converter built into the monitor cart. From there, two fiber optic cables run to the TX and RX sockets. The sockets are located at the rear side of the monitor cart above the power supply connection. Via these two sockets, the two fiber optic links are connected to the hospital network.

Hardware faults

Error	Remedy
Image memory module fault	Replace image memory module
Defective cables Visible damage (kinks, pinches, abrasion, cuts) No connection between two correctly functioning components (e.g. hub – hub), simple continuity test can be performed with a multimeter	Replace cables
Defective socket(s) Visible damage No connection between correctly functioning components (e.g. hub – cable – socket – server)	Replace FOC sockets on the monitor cart If the defective sockets are within the hospital network: Plug the monitor cart into another socket for checking
Cable connection interrupted Cable is not plugged in, cable is defective, socket is defective	Establish cable connection
FOC version: RX and TX cables are swapped The **LINK** LED on **port 2** of the fiber optic converter is not lit.	Swap the RX and TX cables

Table 6-8 Possible hardware faults

6.5.5 System settings

In the **System Settings** menu, you can set or modify the following system parameters with the cursor keys:

- Vario 3D function
- DSA mask
- Ambient light sensor
- Histogram
- Dose area product
- File check
- Collimators
- Language

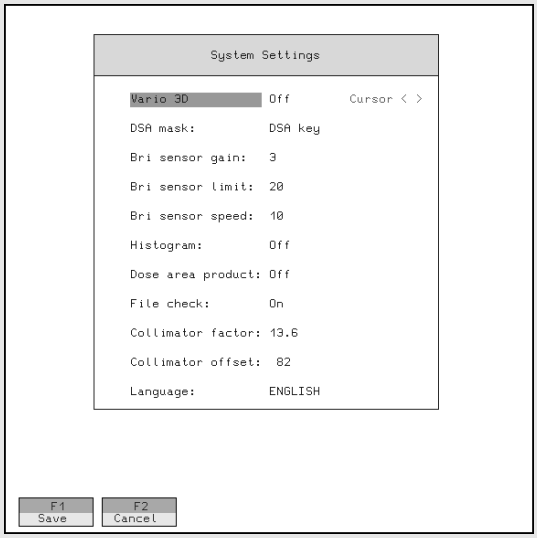


Fig. 6-37 **System Settings** menu

Vario 3D function

On a Ziehm 8000, the **Vario 3D** function must always be set to **Off**.

DSA mask

If the option **Always** is set, a new mask image is acquired during each DSA.

NOTICE

NOTICE

You must always set the **Always** option under **DSA mask**.

Ambient light sensor gain

Under **Bri sensor gain** you define to which extent the system adjusts the screen backlight brightness to the ambient light conditions. You can select a value between 1 (weak gain) and 20 (strong gain).

Ambient light sensor limit value

Under **Bri sensor limit** you specify a maximum value for the screen backlight brightness. You can select a value between 0 and 32.

Ambient light sensor speed

Under **Bri sensor speed** you define how long it takes to adjust the screen backlight brightness to changes in ambient light conditions. You can select a value between 10 s and 60 s.

Histogram

Here you define whether the histogram is displayed or not.

Dose area product

Here you define whether the dose area product is displayed on the live screen or not.

File check

Here you define whether the system checks the internal image data list for corrupt files during power-up. Always set the option **On** here.

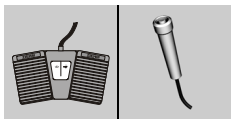
Collimator factor and collimator offset

To match the virtual collimator to the iris collimator, do the following:

- Press the **up arrow** or **down arrow** key until the cursor is on the **Collimator offset** menu item.

- Press the **close iris collimator** key until the collimator is closed as far as possible.

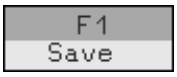
- Initiate radiation and terminate it again.



- Press the **close iris collimator** key.
  The virtual collimator appears on the screen.

- Press the **left arrow** or **right arrow** key until the actual and the virtual collimator coincide.

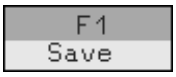
- Press key **F1 – Save**.



- Press the **up arrow** key.
  The **Collimator factor** menu item is selected.

- Press the **open iris collimator** key until the collimator is completely open.

- Press the **left arrow** or **right arrow** key until the actual and the virtual collimator coincide.



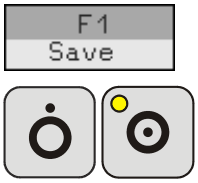
- Press key **F1 – Save**.
- Repeat the collimator offset and collimator factor adjustment alternately until the deviations are minimal.

Language

You can choose between the following languages for the user interface:

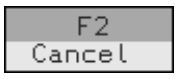
- DEUTSCH
- ENGLISH
- FRANÇAISE
- ITALIANO
- ESPAÑOL
- SVENSKA
- POLSKI
- CZECH

To apply the settings, do the following:



- Press key **F1 – Save**.
- Switch off the system.
- Switch the system back on.
  The new settings are valid now.

To discard system settings that have not been applied yet, do the following:



- Press key **F2 – Cancel**.

or

- Quit the **Service Settings** menu without applying the settings.

6.5.6 HEDIS data

To upload data from the system to a USB stick, do the following:

- In the **Service Settings** menu, press the **up arrow** or **down arrow** key until the cursor is on the **HEDIS data** menu item.

- Press the **Enter** key.
  The keys **F1 – Export** and **F2 – Import** appear on the screen.

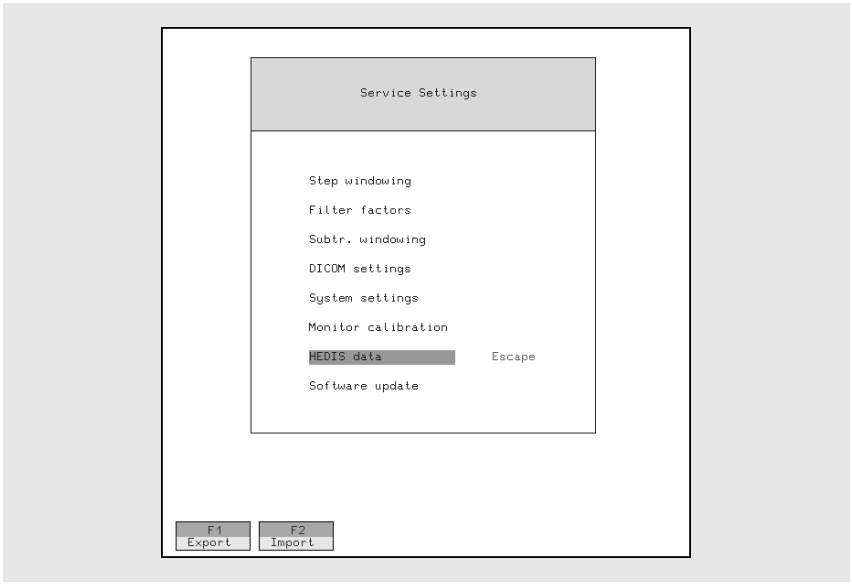


Fig. 6-38 **Service Settings** menu, **HEDIS data** menu item

- Plug the USB stick to which you want to upload the HEDIS data into the USB port.

- Press key **F1 – Export**.
  The HEDIS data is uploaded to the USB stick and saved there.

- Press the **ESC** key.

To download data from a USB stick to the system, do the following:

- In the **Service Settings** menu, press the **up arrow** or **down arrow** key until the cursor is on the **HEDIS data** menu item.

- Press the **Enter** key.
  The keys **F1 – Export** and **F2 – Import** appear on the screen.

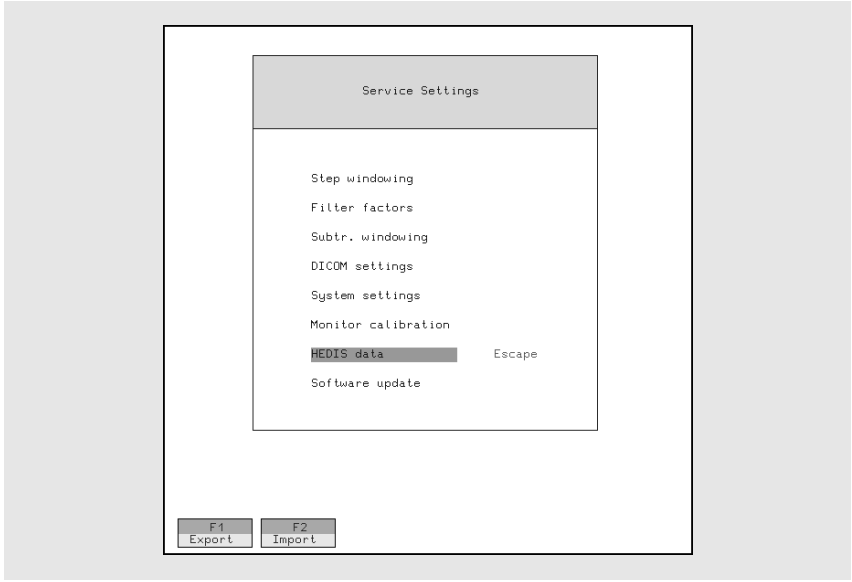
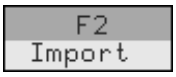


Fig. 6-39 **Service Settings** menu, **HEDIS data** menu item

- Plug the USB stick with the HEDIS data you want to download to the system into the USB port.



- Press key **F2 – Import**.

  The HEDIS data is downloaded from the USB stick to the system and saved.

- Press the **ESC** key.

6.5.7 Software update

To perform a software update, do the following:

- In the **Service Settings** menu, press the **up arrow** or **down arrow** key until the cursor is on the **Software update** menu item.
- Plug the USB stick that contains the first part of the backup copy into the USB port.

- Press the **Enter** key.

  The following confirmation prompt appears:

  Do you really want to update? Y/N

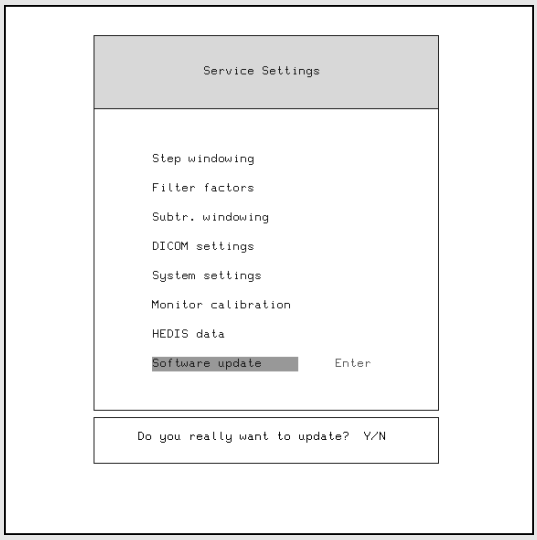
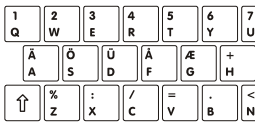
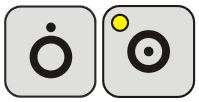


Fig. 6-40 **Service Settings** menu, **Software update** menu item



- Press the **Y** key on the alphanumeric keypad.
  The software update is installed.
- Once the complete software update package has been installed, the following message is displayed:
  Software update is completed
  Please switch the system OFF and ON



- Switch the system off and back on.

7 Technical Data

7.1 Ziehm 8000, Ziehm Compact and Ziehm Compact Litho

In compliance with the requirements of international standards (e.g. 21 CFR 1020.32-d, IEC 60601-2-43), the system emits less than 88 mGy/min in any operating condition.

Voltage / frequency rating		**230 V_{AC} ±10 %, 50/60 Hz**
System	**Power supply fuse rating**	C 16 A (tripping characteristic C acc. to VDE 0641, Part 11; DIN EN 60898 + IEC 898)
	Required residual current circuit breaker (RCD)	$I_N \geq 16$ A, $I_{AN} = 30$ mA
	Typical current consumption	8 A continuous, 15 A momentary
	Power input fuse	15 A, slow (2 pcs.)
	Maximum line impedance	≤ 0,6 Ω
	Equipment protection classification	Protection Class I, Type B (), ordinary equipment, continuous operation
	Radiation controlled area (with generator in lowermost position and C-arm vertical)	15 cm i.i.: 3 m 23 cm i.i.: 4 m

Table 7-1 Technical data Ziehm 8000, Ziehm Compact and Ziehm Compact Litho

Voltage / frequency rating		**230 V_{AC} ±10 %, 50/60 Hz**	
Generator	**Power**	Fluoroscopy:	40–110 kV / 0.2–6 mA
		Direct radiography:	40–110 kV / 20 mA
		Operating frequency:	20 kHz
	Max. operating data	Fluoroscopy:	110 kV / 0.2–6 mA
		Direct radiography:	110 kV / 20 mA
		Exposure time:	0.1–4 s
	Max. power output	Fluoroscopy:	660 W
		Single pulse:	880 W
		Direct radiography:	2200 W
	Nominal electric power	2000 W at 100 kV / 20 mA / 0.1 s	
	X-ray tube	Dual-focus stationary-anode tube	
	Focal spot nominal size	Fluoroscopy:	0,5 mm
		Direct radiography:	1,5 mm
	Total filtration	> 3.9 mm aluminum equivalent	
Image intensifier	**Tube**	Input screen:	Cesium iodide
		Nominal sizes:	
		Ziehm 8000 and Ziehm Compact:	23 / 15 / (10) cm or 15 / 10 cm
		Ziehm Compact Litho:	23 / 15 / (10) cm
	Anti-scatter grid	Pb 8/40	
Monitors on monitor cart	**Flat-screen monitors**	Screen size:	61 cm (24")
		Luminance:	max. 400 Cd/m^2
		Resolution:	1920 × 1200 pixels
		Refresh rate:	85 Hz
		Screen size:	59 cm (23")
		Luminance:	max. 500 Cd/m^2
		Resolution:	1280 × 720 pixels
		Refresh rate:	50 Hz
		Screen size:	46 cm (18.1")
		Luminance:	max. 600 Cd/m^2
		Resolution:	1280 × 1024 pixels
		Refresh rate:	75 Hz

Table 7-1 Technical data Ziehm 8000, Ziehm Compact and Ziehm Compact Litho (cont.)

Voltage / frequency rating		**230 V_{AC} ±10 %, 50/60 Hz**	
Compact monitors	**Flat-screen monitor**	Screen size:	46 cm (18.1")
		Luminance:	600 Cd/m^2
		Resolution:	1280 × 1024 pixels
		Refresh rate:	75 Hz
Environmental conditions	**During storage and transport**	Temperature: –5 °C to +55 °C Relative air humidity: 20 % – 70 %	
	During operation	Temperature: +15 °C to +35 °C Relative air humidity: 20 % – 70 %	
Dimensions of C-arm	**Ziehm 8000 and Ziehm Compact**	Source/image receptor distance:	97 cm
		Vertical free space generator-i.i.:	76 cm
		C-arm depth:	68 cm
		Orbital rotation:	115° / 135° [a]
		Angulation:	± 225°
		Swiveling (panning):	±10°
		Horizontal movement:	22 cm
		Vertical movement:	43 cm / 63 cm [a]
	Ziehm Compact Litho	Source/image receptor distance:	97 cm
		Vertical free space generator-i.i:	76 cm
		C-arm depth:	68 cm
		Orbital rotation:	115° / 135° [a]
		Angulation:	± 225°
		Swiveling (panning):	0°
		Horizontal movement:	0 cm
		Vertical movement:	23 cm

Table 7-1 Technical data Ziehm 8000, Ziehm Compact and Ziehm Compact Litho (cont.)

Voltage / frequency rating		**230 V_{AC} ±10 %, 50/60 Hz**	
Dimensions	**C-arm stand**	Width: Depth: Height:	80 cm 230 cm 214 cm
	Monitor cart	Width: Depth: Height:	71 cm 69,5 cm 169 cm
Weight	**C-arm stand**	Ziehm 8000: Ziehm Compact: Ziehm Compact Litho:	approx. 264 kg (23 cm i.i.) approx. 270 kg (23 cm i.i.) approx. 280 kg (23 cm i.i.)
	Monitor cart	Ziehm 8000 with 24" flat-screen monitor: Ziehm 8000 with 23" flat-screen monitor: Ziehm 8000 with 18.1" flat-screen monitors:	approx. 150 kg approx. 148 kg approx. 153 kg

Table 7-1 Technical data Ziehm 8000, Ziehm Compact and Ziehm Compact Litho (cont.)

a.Option, not available for Ziehm Compact

NOTICE

NOTICE

Temperatures above 40°C and relative air humidity above 60% may cause stains on the printer's heat-sensitive paper.

7.2 Power plug specification

7.2.1 Systems with a voltage rating of 200V, 220V, 230V and 240V

Cables	2.5 mm^2 three-wire supply voltage: two wires ground wire: one wire
Phase	single-phase
Strain relief	required
Voltage	250 V_{AC}
Dielectric strength	≥ 2000 V
Current-carrying capacity	16 A continuous (min.)
Flammability rating	acc. to UL 94 V0
Temperature	–40 °C to +80 °C
Mark of conformity	VDE or equivalent safety testing and national mark of conformity of country of installation (if required)
Equipment protection classification	IP 20 or higher

Table 7-2 Power plug specification

7.3 Laser positioning device

Laser Class	Class 2M acc. to IEC 60825-1:2001-11
Max. power output of continuous laser radiation, measured at the laser beam apertures	< 1 mW
Wavelength of the radiation	635 nm

Table 7-3 Technical data of laser positioning device

7.4 Dose meter

Additional absorption	2.8 mm Al
Sensitivity (75 kV; 2.7 mm Al HVL)	≥ 800 $\frac{\text{pC}}{\text{mGy} \cdot \text{cm}^2}$
Measuring range of DAP power	(0,1–10^4) mGy • cm^2/s
Voltage range	(35–150) kV
Voltage correction	→ *Fig. 7-1, p. 7-6*
Aluminum equivalent	< 0.4 mm

Table 7-4 Technical data of dose meter

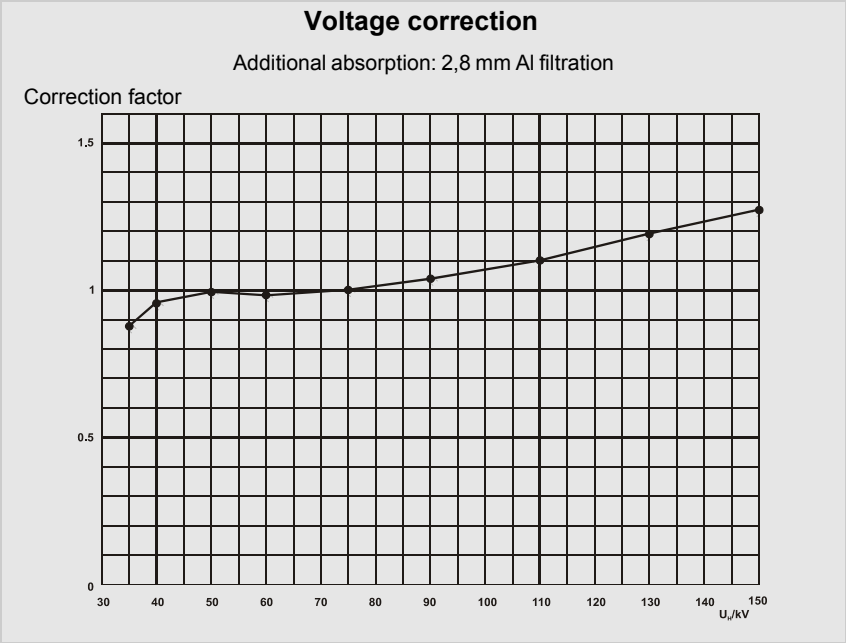


Fig. 7-1 Voltage correction of dose meter

7.5 Air kerma

In compliance with the requirements of international standards (e.g. 21 CFR 1020.32-d (1), IEC 60601-2-43), Ziehm fluoroscopy systems with automatic exposure rate control are not operable at any combination of tube voltage and tube current which will result in an exposure rate in excess of 88 mGy/min at the point where the center of the useful beam enters the patient.

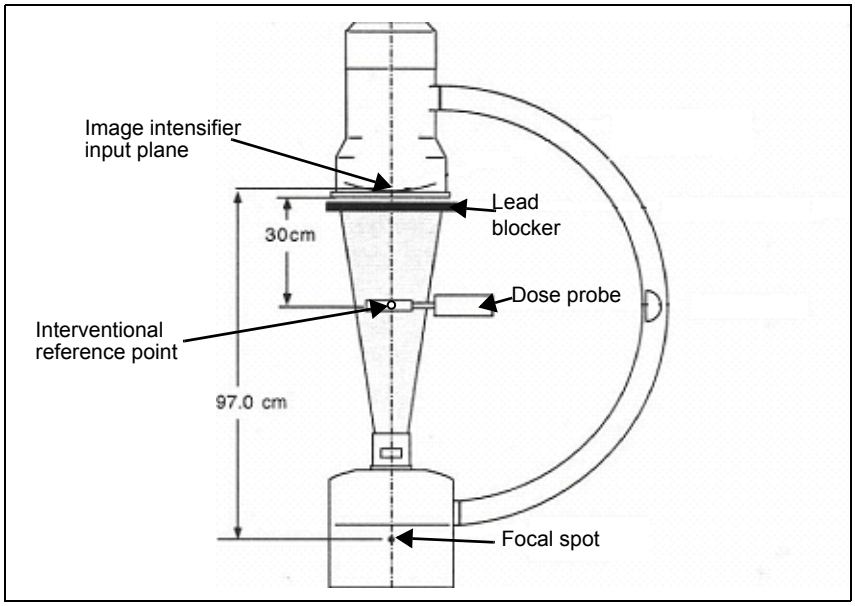


Fig. 7-2 Interventional reference point (Ziehm 8000)

The air kerma that is displayed on the system's user interface refers to the interventional reference point according to IEC 60601-2-43 and 21 CFR 1020.32-d.

Air kerma deviation

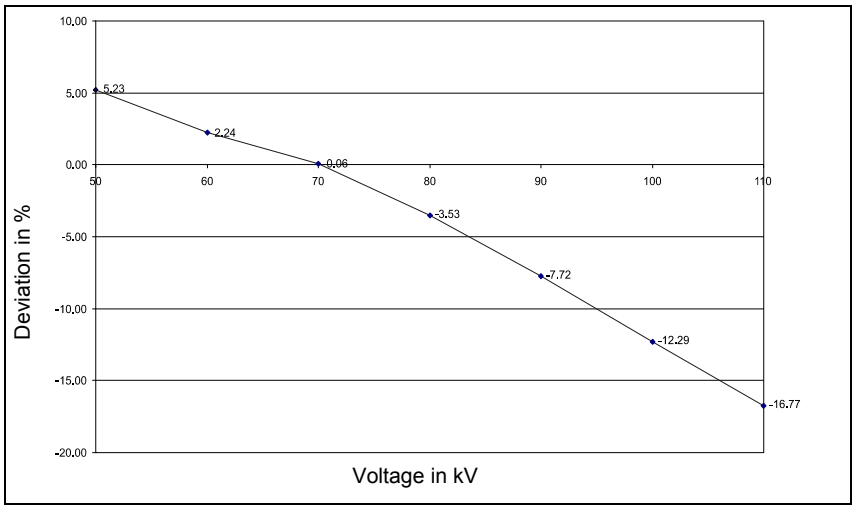


Fig. 7-3 Typical deviation of dose as compared to an external calibrated measurement system

7.6 Focal spot position

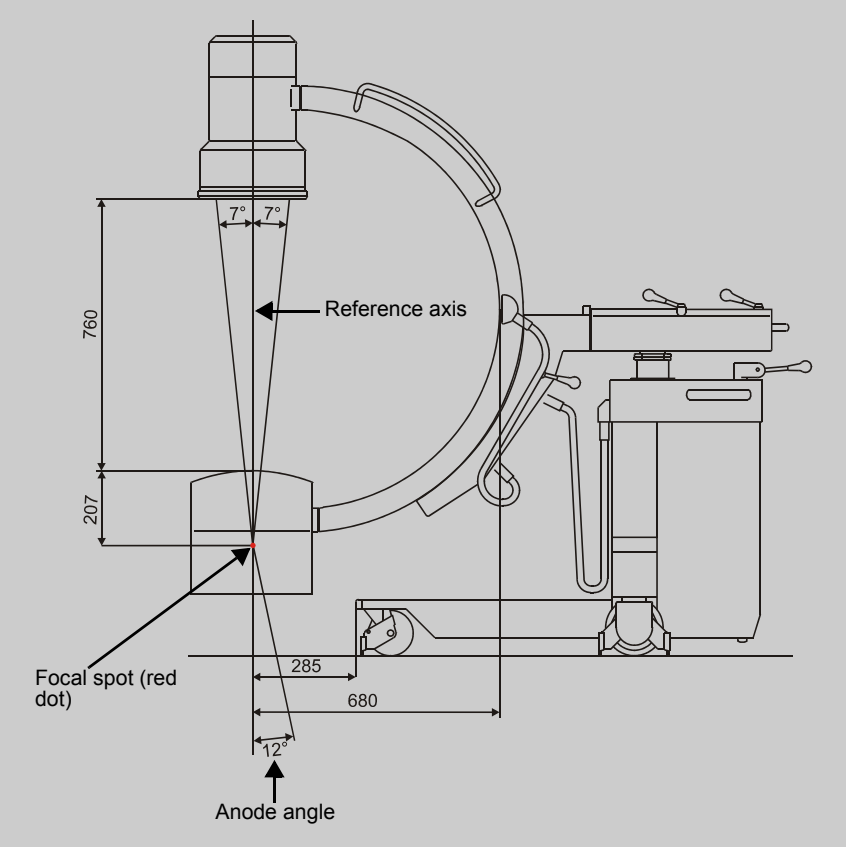


Fig. 7-4 Focal spot position on systems with 23 cm i.i.

7.7 Dimensions

7.7.1 Ziehm 8000

C-arm stand with 23 cm i.i.

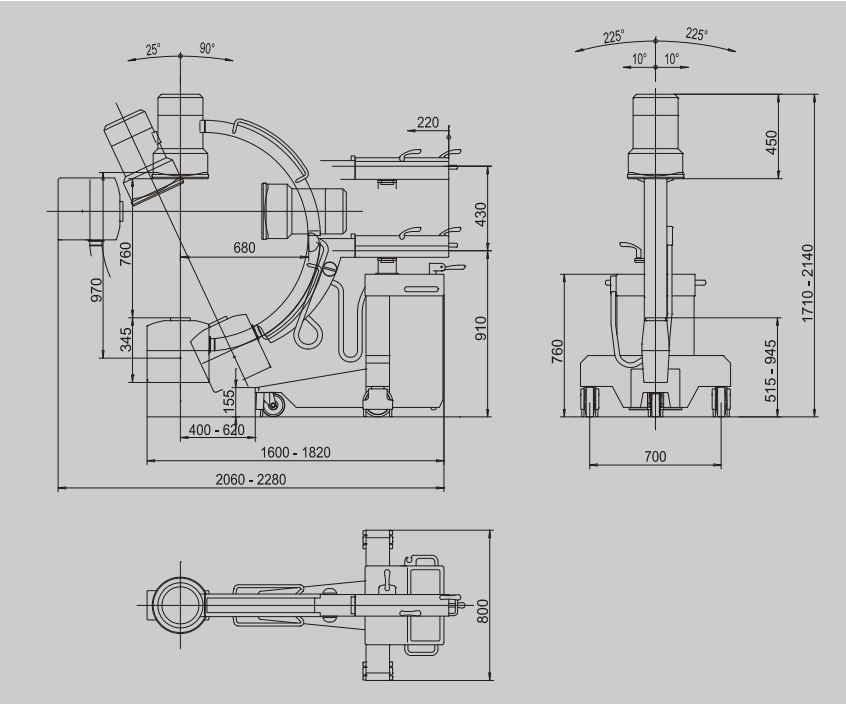


Fig. 7-5 Dimensions of C-arm stand on systems with 23 cm i.i.

Tolerances of C-arm movements

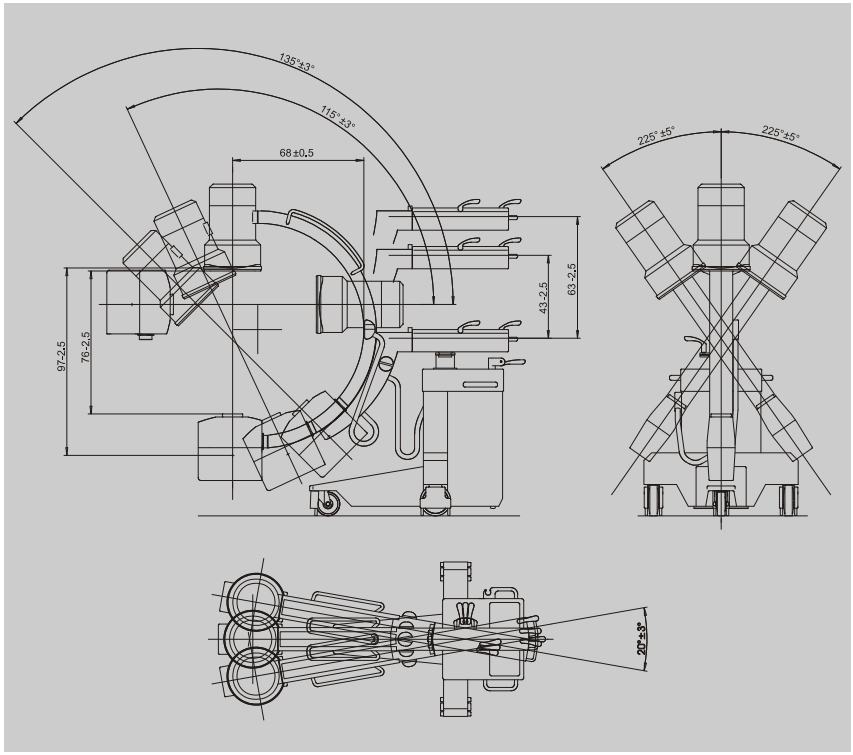


Fig. 7-6 Tolerances of C-arm movements on systems with 23 cm i.i.

C-arm stand with lower C-arm position

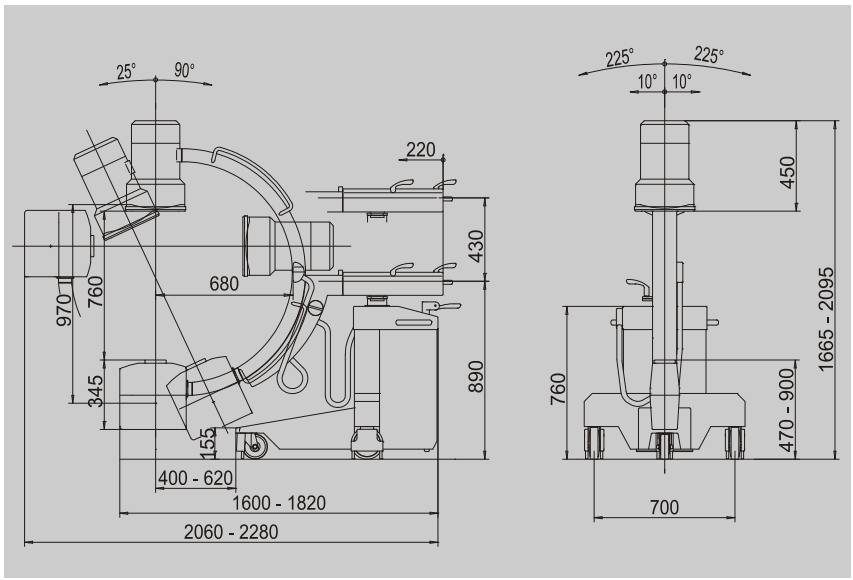


Fig. 7-7 Dimensions of C-arm stand with lower C-arm position

Monitor cart with 24" flat-screen monitor

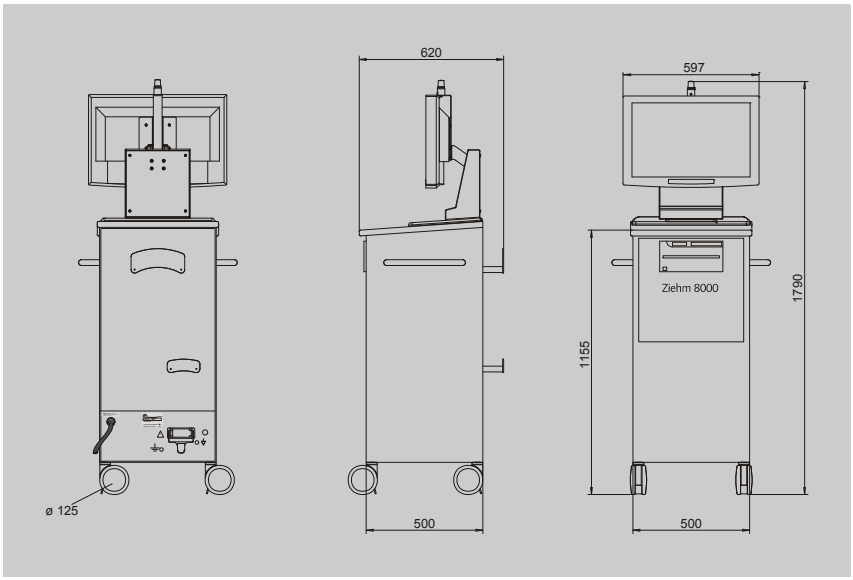


Fig. 7-8 Dimensions of a monitor cart with 24" flat-screen monitor

Monitor cart with 23" flat-screen monitor

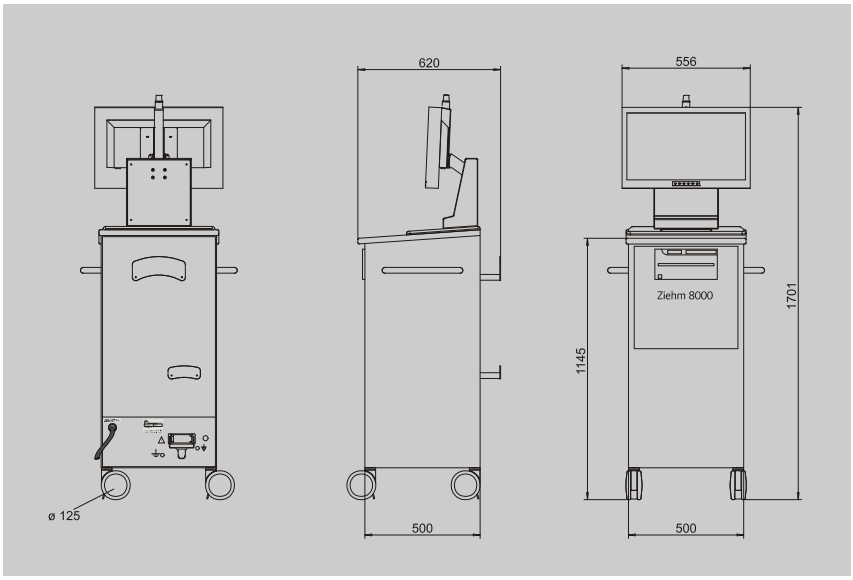


Fig. 7-9 Dimensions of a monitor cart with 23" flat-screen monitor

Monitor cart with 18.1" flat-screen monitors

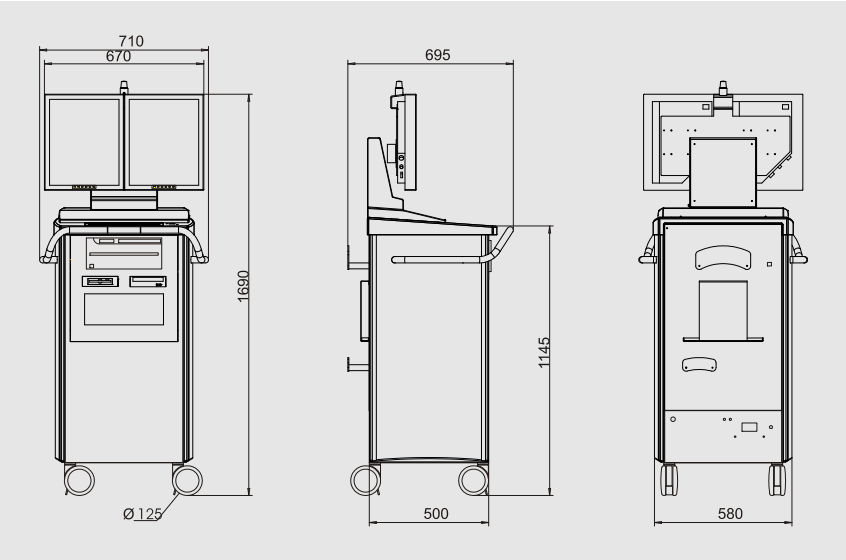


Fig. 7-10 Dimensions of a monitor cart with 18.1" flat-screen monitors

7.7.2 Ziehm Compact

Ziehm Compact with flat-screen monitor and 23 cm i.i.

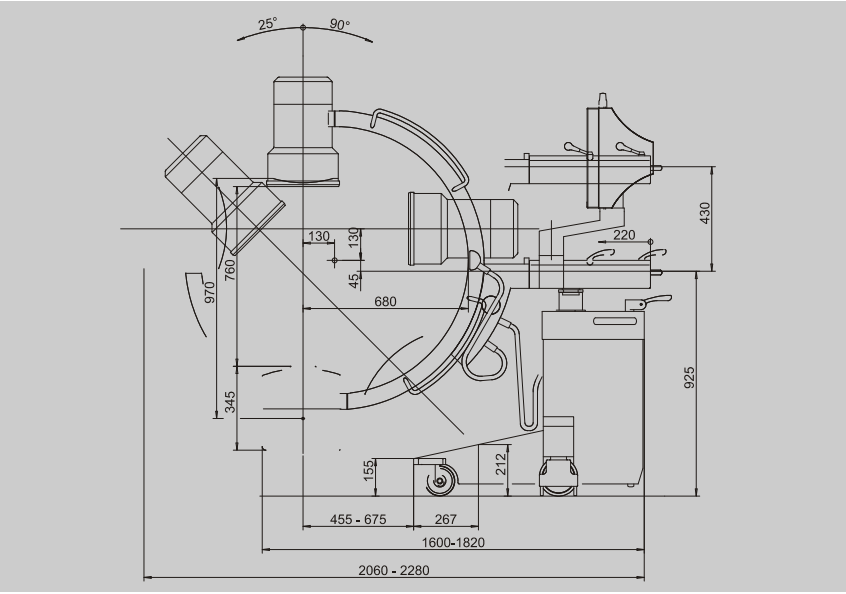


Fig. 7-11 Dimensions of a Ziehm Compact with flat-screen monitor and 23 cm i.i.

7.7.3 Ziehm Compact Litho

Ziehm Compact Litho with 23 cm i.i.

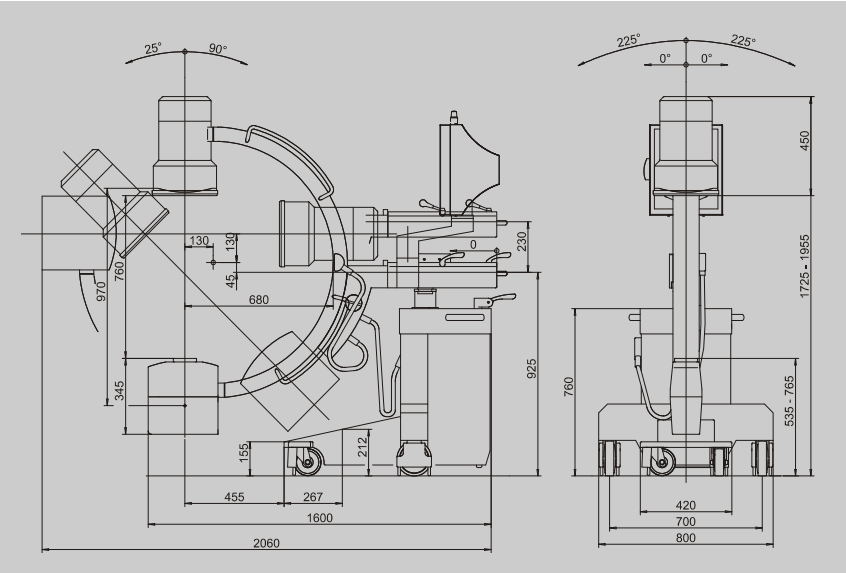


Fig. 7-12 Dimensions of Ziehm Compact Litho with 23 cm i.i.

8 Maintenance

8.1 General requirements

WARNING

Maintenance of this system must be carried out by trained personnel only.

Some checks may only be performed by authorized service engineers. Those checks are marked accordingly.

The regulation for designing, operating and using medical devices (MPBetreibV) in Germany or other relevant federal regulations applicable in other countries require regular inspections (safety-related inspections).

In general the equipment owner is held liable for performing them.
Ziehm Imaging GmbH recommends safety-related inspections every 12 months and will gladly assist you in performing them.

Keep a record of all checks and inspections the equipment is subject to and include them with the medical devices log book, which you are obliged to keep as the equipment owner.

USA

The Food and Drug Administration (FDA) requires that the checks and inspections described in the related document *CDRH Maintenance Report*. be performed at least every six months, in order to ensure that the X-ray system complies with federal regulations (specifically, the applicable sections of CFR 21, Subchapter J – Radiological Health).

The equipment owner is responsible for ensuring that the maintenance steps described in the said document are performed every six months. Failure to comply with this requirement relieves the Manufacturer and his agents of all responsibility in this matter.

The equipment owner is furthermore responsible for ensuring that only service engineers certified by the manufacturer perform the tests and adjustments described in the above document.

Service engineers are responsible for performing the procedure in the sequence shown in the *CDRH Maintenance Report*.

8.2 Electrics

WARNING

Maintenance of this system must be carried out by trained personnel only. Some checks may only be performed by authorized service engineers. Those checks are marked accordingly.

Check the following functions at the specified time intervals:

Person in charge	Object	Action required	Whenever necessary	Monthly	Yearly
Trained personnel	Consistency test	Perform according to relevant national regulation of the country of installation		X	
	Power cable	Inspect for physical damage		X	
	Electrical safety	Check according to relevant national regulation of the country of installation			X
	Hand switch	Inspect cable for damage		X	
	Foot switch	Inspect cable for damage		X	
	Motorized vertical travel	Move up and down to respective limit stops		X	
	C-arm stand control panel	All segments are activated during power-up		X	
	Flat-screen monitors	Contrast and brightness can be adjusted		X	
		Clean screens with a mild detergent mixed with water	X		
Trained personnel	Fluoroscopy modes	Activate each mode, the corresponding LED must light up			X
	Coupling cable	Inspect cable, plug-and-socket connections and anti-kink sleeves for physical damage		X	
	Swivel harness	Inspect hose for physical damage		X	

Table 8-1 Regular electrical checks without radiation release

Checks involving radiation To be able to check the following functions, you must initiate radiation:

WARNING

Always observe the safety and precautionary measures required by the relevant national X-ray and radiation protection regulations.

Person in charge	Object	Action required	Whenever necessary	Monthly	Yearly
Trained personnel	Radiation warning lamp	Must be lit during radiation		X	
	Hand switch	Must function with fluoroscopy and direct radiography		X	
		Dead man's control for direct radiography		X	
	Foot switch	Must not release radiation in **direct radiography** mode		X	
Trained personnel	Fluoroscopy	The X-ray symbol on the control panel is lit			X
		The **radiation time** display is counting up during radiation			X
		"Unsaved" marks on the live screen disappear			X
		An audible alarm sounds after 5 minutes of radiation time			X
		Press **min** key briefly: The audible alarm is switched off Press **min** key for more than 3 s: The **radiation time** display is reset to zero			X
	Iris collimator	Open and close			X
	Slot collimator	Open and close, turn in both directions until reaching the right/left limit stops			X
	Direct radiography (option)	Exposure time can be set between 0.1 and 4 s.			X
		All film sizes can be selected, the LED of the corresponding key must light up			X
		An audible alarm sounds throughout the exposure time		X	

Table 8-2 Regular electrical checks with radiation release

8.3 Mechanics

WARNING

Maintenance of this system must be carried out by trained personnel only. Some checks may only be performed by authorized service engineers. Those checks are marked accordingly.

Check the following functions or perform the following maintenance work at the specified time intervals:

Person in charge	Object	Action required	Whenever necessary	Monthly	Yearly
Trained personnel	X-ray generator	Inspect for physical damage (e.g. oil leakage)		X	
	C-arm stand wheels	Clean tread surfaces, cable guards and bearings	X		
	Monitor cart wheels	Clean tread surfaces, cable guards and bearings	X		
		Check proper locking of the parking brake		X	
	C-arm	Clean gliding surface		X	
		Check retention force of orbital rotation brake in all C-arm positions		X	
		Check C-arm bearing for running noise			X
	Motorized vertical travel	Clean gliding surface of lifting column	X		
	C-arm stand and monitor cart control panels	Inspect foil for damage		X	
	Labels on the unit	Check whether all warning and information labels are legible		X	

Table 8-3 Regular mechanical checks

Person in charge	Object	Action required	Whenever necessary	Monthly	Yearly
Authorized service engineer	C-arm stand wheels	Readjust or replace brake blocks	X		
		Check firm seat of wheel brackets		X	
	Monitor cart wheels	Check firm seat of wheel brackets		X	
	Steering	Check mechanical play between steering lever and wheels			X
	Clamping levers of mechanical brakes	Grease thread with *Varilub extreme pressure lubricant*			X
	Motorized vertical travel	Grease lifting spindle with *Varilub extreme pressure lubricant*			X
		Inspect bearings for damage			X

Table 8-3 Regular mechanical checks (cont.)

9 Replacing Components

9.1 Hand switch and foot switch

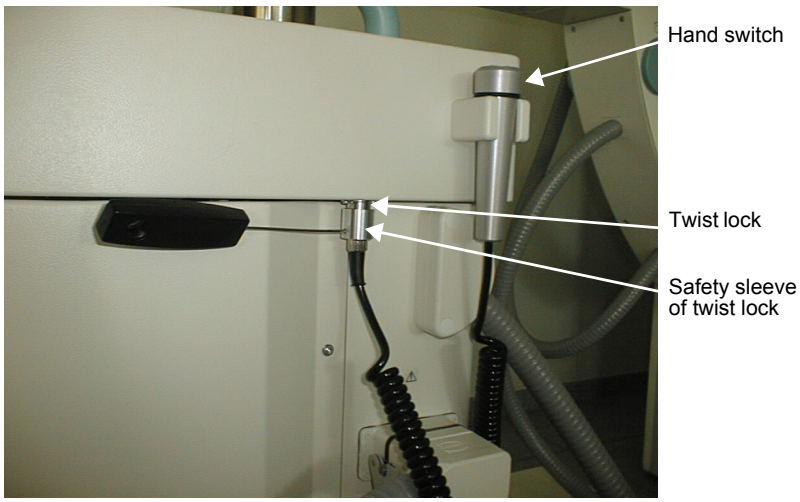


Fig. 9-1 Connection of hand switch cable

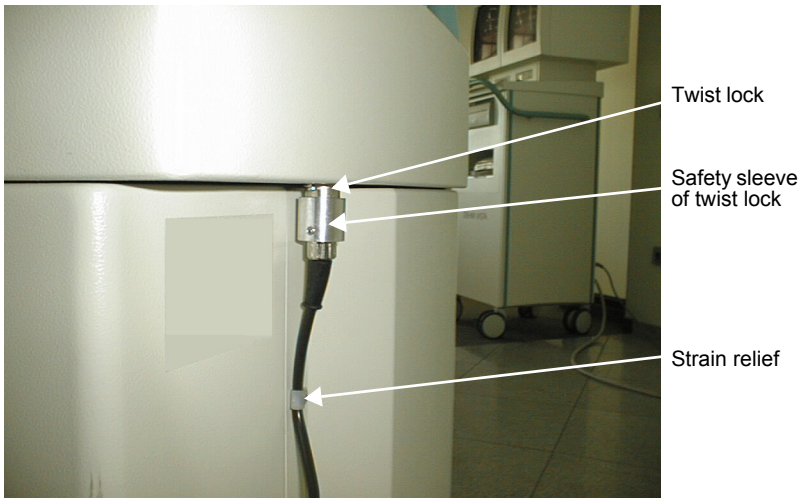


Fig. 9-2 Connection of foot switch cable

To replace the hand or foot switch, do the following:

- Unscrew the safety sleeve of the twist lock using an Allen key (2 mm).
- **Foot switch**: Unscrew the strain relief using an Allen key (2.5 mm).
- Open the twist lock.

- Unplug the cable.
- Plug in the cable of the new switch.
- Close the twist lock.
- **Foot switch**: Screw down the strain relief using an Allen key (2.5 mm).
- Screw down the safety sleeve of the twist lock using an Allen key (2 mm).

9.2 Coupling cable

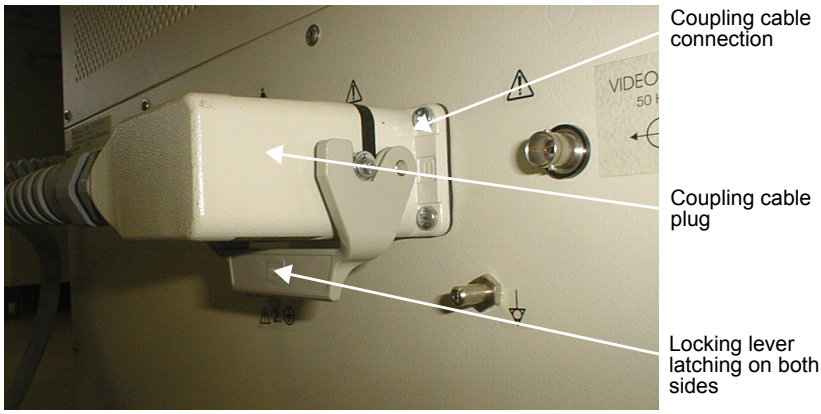


Fig. 9-3 Coupling cable connection

To replace the coupling cable, do the following:

- Press the locking lever toward the unit.
  The latches open.
- Unplug the coupling cable.
- Plug in the new coupling cable.
- Pull the locking lever away from the unit so that the latches lock.

9.3 Fuses

	Rating	Art. No.	Function
Transformer TR1 (11079)			
F2	10A, slow (5×20 mm)	17007	Supply of lifting motor
F3	10A, slow (5×20 mm)	17007	Supply of U326 – heating current
Transformer TR2 (11081)			
F1	2A, slow (5×20 mm)	17006	Line-side fuse TR2
F4	4A, slow (5×20 mm)	17021	Supply for component 1 (18V) on U333
F5	4A, slow (5×20 mm)	17021	Supply for different 5V voltages on U334
F6	1A, slow (5×20 mm)	17019	
F7	1A, slow (5×20 mm)	17019	
F8	1A, slow (5×20 mm)	17019	
F9	1A, slow (5×20 mm)	17019	Supply for monitor rotation

Table 9-1 Transformer fuses

	Rating	Art. No.	Function
F1	15 A, fast (6.3×32mm)	17076	230V power supply
F4	15 A, fast (6.3×32mm)	17076	
F5	1A, slow (5×20 mm)	17019	Load resistor (RL) for transformer 11079
F7	100 mA, slow (5×20mm)	17056	Input of transformer 11080 on U333
F8	250 mA, slow (5×20mm)	17001	Output of transformer 11080 on U333

Table 9-2 Fuses on U333

	Rating	Art. No.	Function
F2	20 A, slow (6.3×32 mm)	17044	120V power supply
F3	20 A, slow (6.3×32 mm)	17044	

Table 9-3 Fuses on the transformer mounting plate

Name	Rating	Function
F1A	15 A, slow	Power fuse for 210-220-230-240 V_{AC}
	20 A, slow	Power fuse for 105-110-115-120 V_{AC}
F1B	15 A, slow	Power fuse for 210-220-230-240 V_{AC}
	20 A, slow	Power fuse for 105-110-115-120 V_{AC}

Table 9-4 External fuses on the monitor cart

10 Problem Report

10.1 List of error and alert messages

Code	Type	Description	Measures
E 16	Alert	Hand switch 1 pressed during power-up	Release hand switch and acknowledge alert message by briefly pressing hand or foot switch. **Caution:** On systems with four-pedal foot switch, hand switch 1 = foot switch 1 (left to right)
E 17	Alert	Foot switch 1 pressed during power-up	Release foot switch and acknowledge alert message by briefly pressing hand or foot switch. **Caution:** On systems with four-pedal foot switch, foot switch 1 = foot switch 3 (left to right)
E 18	Alert	Hand switch 2 pressed during power-up	Release hand switch and acknowledge alert message by briefly pressing hand or foot switch. **Caution:** On systems with four-pedal foot switch, hand switch 2 = foot switch 2 (left to right)
E 19	Alert	Foot switch 2 pressed during power-up	Release foot switch and acknowledge alert message by briefly pressing hand or foot switch. **Caution:** On systems with four-pedal foot switch, foot switch 2 = foot switch 4 (left to right)
E 20	Error	Short circuit in hand or foot switch cable	Please contact after-sales service!
E 21	Alert	Radiation warning lamp defective	Please contact after-sales service!
E 22	Alert	Internal fault	Please contact after-sales service!
E 23	Alert	Internal fault	Please contact after-sales service!
E 24	Alert	Internal fault	Please contact after-sales service!

Table 10-1 List of error and alert messages

Code	Type	Description	Measures
E 25	Error	Internal fault	Please contact after-sales service!
E 26	Error	Internal fault	Please contact after-sales service!
E 27	Error	Internal fault	Please contact after-sales service!
E 28	Error	Internal fault	Please contact after-sales service!
E 29/ E 26 (alternately)	Alert	Ziehm 8000 without Active Cooling: General generator fault or Generator overheated (**temperature symbol** on the C-arm stand illuminated)	Please contact after-sales service! or Allow generator to cool down
		Ziehm 8000 with Active Cooling: General generator fault	Please contact after-sales service!
E 30	Error	Internal fault	Please contact after-sales service!
E 31	Alert	Internal fault	Please contact after-sales service!
E 32	Alert	Internal fault	Please contact after-sales service!
E 33	Error	Internal fault	Please contact after-sales service!
E 34	Alert	Internal fault	Please contact after-sales service!
E 35	Alert	Internal fault	Please contact after-sales service!
E 36	Alert	Internal fault	Please contact after-sales service!
E 37	Alert	Internal fault	Please contact after-sales service!
E 38	Alert	Internal fault	Please contact after-sales service!
E 39	Alert	Internal fault	Please contact after-sales service!
E 40	Alert	Internal fault	Please contact after-sales service!
E 41	Alert	Internal fault	Please contact after-sales service!
E 42	Alert	Internal fault	Please contact after-sales service!
E 43	Error	Dose meter check (VacuDAP, VacuDAP C): Value measured is outside the tolerance range	Repeat dose meter check. If the error message appears again, contact after-sales service.
E 44	Error	Control connection to monitor cart interrupted	Please contact after-sales service!
E 45	Error	Internal fault (VacuDAP duo)	Acknowledge error message by briefly pressing hand or foot switch.

Table 10-1 List of error and alert messages (cont.)

Code	Type	Description	Measures
E 46	Error	During power-up: Error in VacuDAP duo dose meter system	Acknowledge error message by briefly pressing hand or foot switch.
		During operation: Error in VacuDAP duo dose meter system	Press **min** key (long keystroke).
E 47	Error	Measuring value limit of 9999.9 cGy cm^2 or 999.99 mGy has been exceeded. If the measuring value limit for the air kerma rate (999.99 mGy/min.) is exceeded during an exposure, radiation is not interrupted. The error number appears after radiation has been terminated. It is not possible to reinitiate radiation.	Press **min** key (long keystroke).
E 48	Error	Dose meter check (VacuDAP duo): Error in dose meter system	Acknowledge error message by briefly pressing hand or foot switch to be able to continue working with the system. Please contact after-sales service!
E 51	Error	Internal fault	Please contact after-sales service!
E 52	Error	Internal fault	Please contact after-sales service!
E 53	Error	Internal fault	Please contact after-sales service!
E 54	Error	Internal fault	Please contact after-sales service!
E 55	Error	Internal fault	Please contact after-sales service!
E 56	Error	Internal fault	Please contact after-sales service!
E 57	Error	Internal fault	Please contact after-sales service!
E 58	Error	Internal fault	Please contact after-sales service!
E 59	Error	Internal fault	Please contact after-sales service!
E 60	Error	Internal fault	Please contact after-sales service!
E 61	Error	Internal fault	Please contact after-sales service!
E 62	Error	Internal fault	Please contact after-sales service!
E 63	Error	Internal fault	Please contact after-sales service!
E 64	Alert	Internal fault	Please contact after-sales service!
E 65	Error	Internal fault	Please contact after-sales service!
E 90	Alert	Internal fault	Please contact after-sales service!

Table 10-1 List of error and alert messages (cont.)

Code	Type	Description	Measures
E 91	Alert	Internal fault	Please contact after-sales service!
E 92	Alert	Radiation warning lamp on the monitor cart defective	Please contact after-sales service!
E 93	Error	Internal fault	Please contact after-sales service!
E100	Error	Internal fault	Please contact after-sales service!
E101	Alert	CD-Recall is selected, fluoroscopy inhibited	Deactivate **CD recall** under **Configuration Menu** → **User Settings**
E102	Error	Internal fault	Please contact after-sales service!
E105	Alert	Not enough hard disk space available for operation	Delete a protected patient folder after unprotecting it with the key combination **Shift+F4**. Perform a backup of the hard disk as soon as possible and then delete the backed-up patient folders
E106	Error	Hard disk access error The system continues to operate in restricted mode: radiation can be initiated, but no images can be saved.	Please contact after-sales service!
E151	Alert	Internal fault	Please contact after-sales service!

Table 10-1 List of error and alert messages (cont.)

10.2 What to do if ...

Situation	Remedy
The monitor screens remain dark for more than approx. 1 min after switching on the system. • Press the **MENU** key. The LED of the **MENU** key lights up. The memory software is running.	• Check the voltage supply of the monitors and the video connection. If all of the green LEDs on the monitor chassis plate are lit, the monitor voltage supply and the video connection are O.K. **or** • Check whether the I^2C bus cable is connected to the I^2C connector (and not to the CRT connector). **or** • Check whether the flat-screen monitors are switched on (small switches on the back of the monitors).
The monitor screens remain dark for more than approx. 1 min after switching on the system. • Press the **MENU** key. The LED of the **MENU** key does not light up. The memory software is not running.	• Check the voltage supply of the image memory module. The main switch may be off. **or** • Check the voltage supply and the data cable of the CD writer.

Table 10-2 Troubleshooting

10.3 Failure of the power supply

If the power supply fails, the system switches off automatically. Any unsaved patient data and/or images are lost.

Patient data and images that were saved to hard disk with the **save** function are preserved even after a power supply failure.

NOTE

Save all images that you might need later to hard disk with the **save** function during operation of the unit.

11 Disassembling the System

11.1 Dismounting the 23" or 24" flat-screen monitors

NOTICE

NOTICE

Always wear cotton gloves when installing, testing or making settings on displays or screens.

To dismount the flat-screen monitor from the monitor cart base, do the following:

- Remove the rear cover of the monitor cart base.
- Remove the rear cover of the monitor neck.
- To detach the ground wire from the monitor neck housing (→ *Fig. 11-1, p. 11-2*), remove nut and washer from the screw, remove the ground wire from the screw, place the washer on the screw again and retighten the nut.
- Unplug the video cable (labeled **LM**) and the radiation warning lamp cable (cable labeled **Xray-Ind**, connection labeled **X-ray lamp**) from the image memory.
- Inside the monitor cart base detach the flat-screen monitor power plug from the power supply unit.
- Pull the following cables from the monitor cart base up into the monitor neck (→ *Fig. 11-1, p. 11-2*):
  - Video cable (labeled **LM**)
  - Radiation warning lamp cable (labeled **Xray-Ind**)

- Pull the ground wire from the monitor neck down into the monitor cart base.

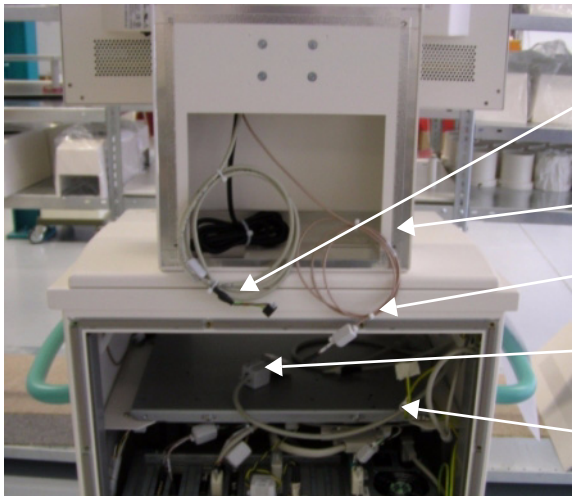

Radiation warning lamp cable (labeled **Xray-Ind**)
Ground connection (internal)
Video cable (labeled **LM**)
Power plug of the flat-screen monitor
Ground wire

Fig. 11-1 Cables inside monitor neck and monitor cart base

- Undo the 4 screws M6×16 that attach the flat-screen monitor to the monitor cart base.

NOTE

Since the flat-screen monitor will be mounted onto a transport rack, you do not need the screws (M6×16) that held the monitor head to the monitor cart base at this point. Put these screws in the accessories box (→ *Ch. 12.5, p. 12-5*).

- With the help of a second person, lift the flat-screen monitor off the monitor cart base.

WARNING

The flat-screen monitor cannot be lifted by one person alone. Therefore always ask a second person to assist you in lifting the flat-screen monitor off the monitor cart base.

NOTICE

Never place the flat-screen monitor directly on some surface, always place them on the transport rack.

- Carefully place the monitor head on the transport rack.

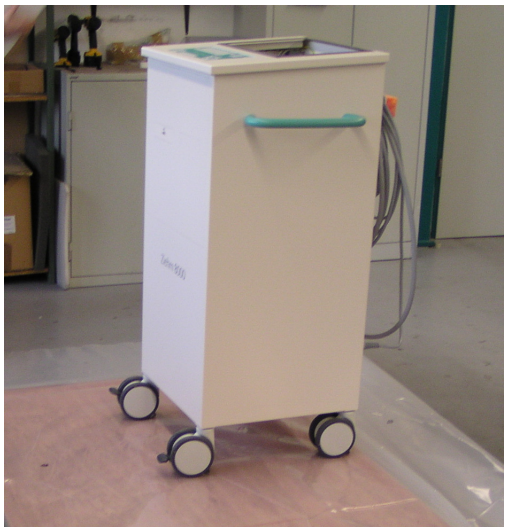


Fig. 11-2 Monitor cart base without monitor head

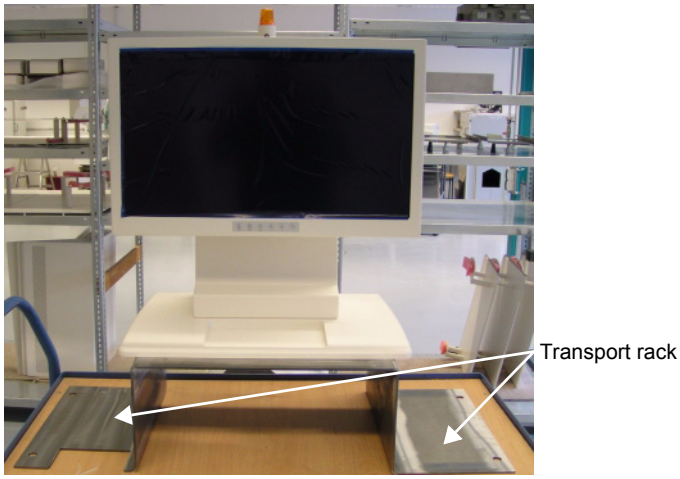


Fig. 11-3 23" or 24" flat-screen monitor on the transport rack

- Mount the monitor head to the transport rack using four screws.
- Reattach the rear cover of the monitor neck using four screws.
- Reattach the rear cover of the monitor cart base.
- Inside the monitor cart tape the power plug to the side panel.

11.2 Dismounting the 18.1" flat-screen monitors

NOTICE

NOTICE

Always wear cotton gloves when installing, testing or making settings on displays or screens.

To dismount the flat-screen monitors from the monitor cart base, do the following:

- Remove the rear cover of the monitor cart base.
- Remove the rear cover of the flat-screen monitors.
- To disconnect the ground wire from the monitor cart base, remove the nut, withdraw the ground wire from the screw and retighten the nut.
- Unplug the video cables and the radiation warning lamp cable from the image memory module.
- Disconnect the power supply units of the flat-screen monitors from the corresponding connectors for non-heating devices.

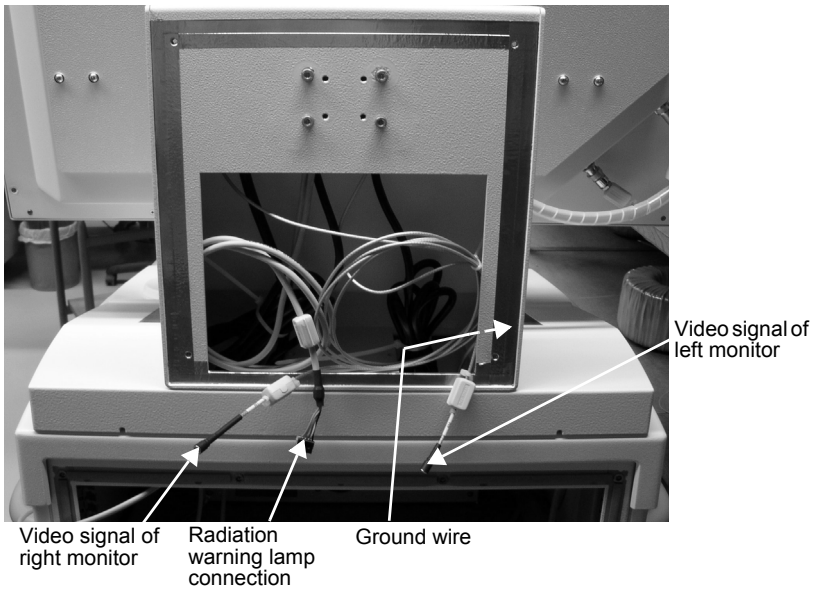


Fig. 11-4 Connections on the flat-screen monitors

- Pull the following cables from the monitor cart base up into the monitor housing (→ *Fig. 11-4, p. 11-4*):
  - 2 video cables (golden)
  - Radiation warning lamp cable
  - Ground wire

- Undo the 4 screws M6×16 that attach the flat-screen monitors to the monitor cart base.

NOTE

Since the flat-screen monitors will be mounted onto a transport rack, you do not need the screws (M6×16) that held the monitor head to the monitor cart base at this point. Put these screws in the accessories box (→ *Ch. 12.5, p. 12-5*).

- With the help of a second person, lift the flat-screen monitors off the monitor cart base.

WARNING

The flat-screen monitors cannot be lifted by one person alone. Therefore always ask a second person to assist you in lifting the monitors off the monitor cart base.

NOTICE

Never place the flat-screen monitors directly on some surface, always place them on the transport rack.

- Reattach the rear cover of the monitor cart base.

12 Mounting the System on a Pallet

12.1 Safety instructions and information

12.1.1 Safety instructions

WARNING

WARNING

Only authorized personnel is allowed to pack and unpack the system. Authorized personnel are persons who have attended an appropriate training course provided by the manufacturer.

WARNING

WARNING

Always observe the general occupational safety and accident prevention regulations!

WARNING

WARNING

When handling detergents and solvents, strictly observe the safety instructions provided by the respective manufacturer!

12.2 Information

Scope of validity

These instructions apply to the shipment of Ziehm 8000 X-ray systems on pallets. Please pay special attention to the additional information referring to sea transport.

12.3 Environmental conditions

The system must not be exposed to extreme ambient conditions. The following minimum/maximum values must not be exceeded during storage or operation:

Storage/transport:

- Temperature: -5 °C to +55 °C
- Relative air humidity: 20 % - 70 %

Operation:

- Temperature: +15 °C to +35 °C
- Relative air humidity: 70 % max.

WARNING

WARNING

Do not put the system into service at temperatures below 15 °C!

NOTICE

NOTICE

Temperatures above 40°C and relative air humidity above 60% may cause stains on the printer's heat-sensitive paper.

12.4 Packing material and contents

12.4.1 Material

List

Article	Art. No.
Pallet	26374
Transport rack with	66245
4 screws M10×25 with washers and	56172, 57032
4 wood screws 10×40	56285
Steel retaining brackets:	
Retaining bracket 1 with	65827
2 wood screws 10×40	56285
2 retaining brackets 2 with	65828
4 wood screws 10×40	56285
Retaining bracket 3 with	65829
2 Allen screws M8×20	56137
Retaining bracket 4 with	65830
2 wood screws 10×40	56285
Rigid foam	26240
Wooden laths 380mm × 80mm × 60mm with	13112
rubber strips	54067
Cardboard box for the pallet	26372
Cardboard box for accessories	26392
Bubble wrap	
Foam rubber	
Detergents:	
Bioclean	
Foam-Cleaner	
Nitro solvent	
Styrofoam material	

Table 12-1 Packing material

Article	Art. No.
Particle board 740mm × 460mm × 20mm with 4 particle board screws, 80mm long	
Clout nails	
2 boards	
Cross lath	
2 shock watch devices	
Label “Transportkontrolle – Monitored shipment”	
Address label	
Label “Vorsicht Glas” [Glass – Handle With Care]	
Monitors: Transport rack for flat-screen monitors with 4 screws M6×12 and 4 wood screws 10×40	 6.03364.1 56232 56285

Table 12-1 Packing material (cont.)

Fig. 12-1 Packing material

12.4.2 Parts to be packed

- Monitor cart
- C-arm stand
- Flat-screen monitors (monitor head)
- Ramp (for drop shipments)
- Accessories

12.5 How to pack the accessories

To pack the accessories on the pallet, do the following:

- Assemble the cardboard box for the accessories.
- Pad the cardboard box with bubble wrap.
- Place all accessories (→ *Ch. 1.3, p. 1-4*) inside the cardboard box.
- Close the cardboard box and tape shut it with shipping tape.
- After having mounted the monitor cart, the C-arm stand and the monitor head on the pallet (see *Ch. 12.6* and *Ch. 12.7*), place the accessories box on the pallet as illustrated in *Fig. 12-2*.

Fig. 12-2 Position of the accessories box on the pallet

- Place a styrofoam block between cardboard box and retaining bracket to prevent the box from moving back and forth.

12.6 Packing the monitor cart

To mount the monitor cart on the pallet, do the following:

- Place the ramp to the short front side of the pallet.

NOTE

If you use the ramp supplied with a drop shipment, then attach the ramp to the sides of the pallet using both fixing clamps (→ *Fig. 12-3*).

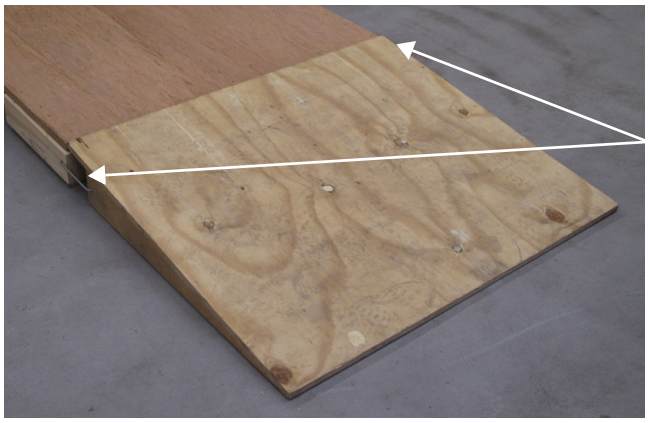


Fig. 12-3 Pallet with attached ramp

- Place a sufficiently dimensioned piece of wrap foil on the pallet.
- Fold the excessive wrap foil to the sides of the pallet.

Fig. 12-4 Pallet with wrap foil

- Carefully push the monitor cart onto the pallet using a ramp.

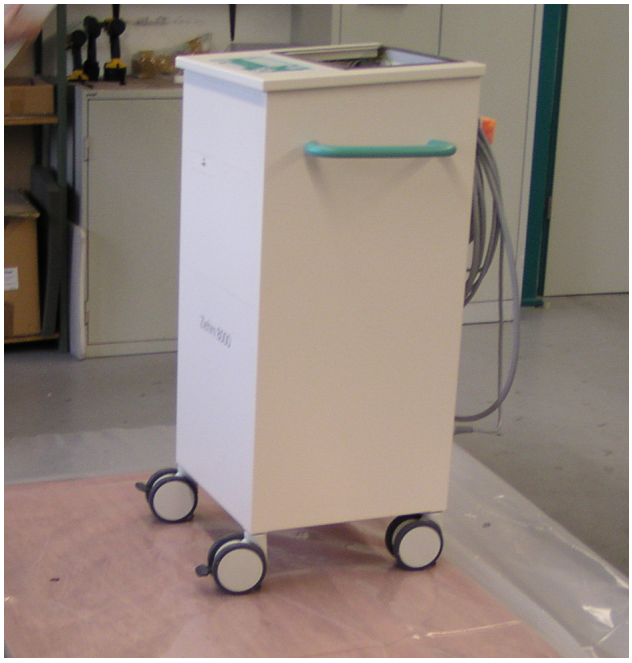


Fig. 12-5 Monitor cart base without monitor head

- Place a foam rubber block as padding on the pallet and put the monitor cart into the position shown below (→ *Fig. 12-6*) with the help of a second person.

WARNING

Due to the heavy weight of the monitor cart there is a risk that it will tilt over if not blocked.
Therefore never move the unit alone into the position illustrated (→ *Fig. 12-6*), always ask a second person to assist you!

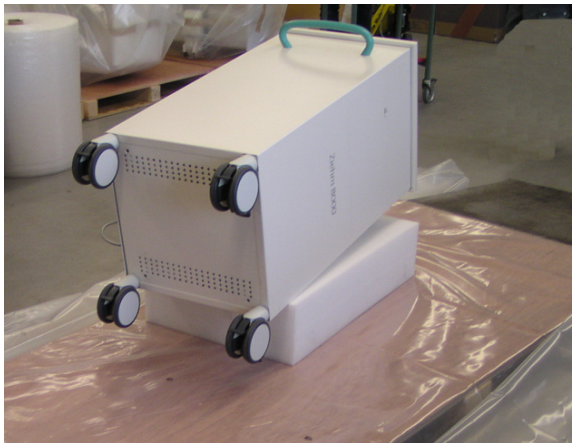


Fig. 12-6 Monitor cart lying flat on the pallet

- Tape foam rubber to the cable support (→ *Fig. 12-7*).
- Wrap the wheels in bubble wrap.

- Fasten the transport rack at the bottom plate of the monitor cart using the four screws provided for that purpose.

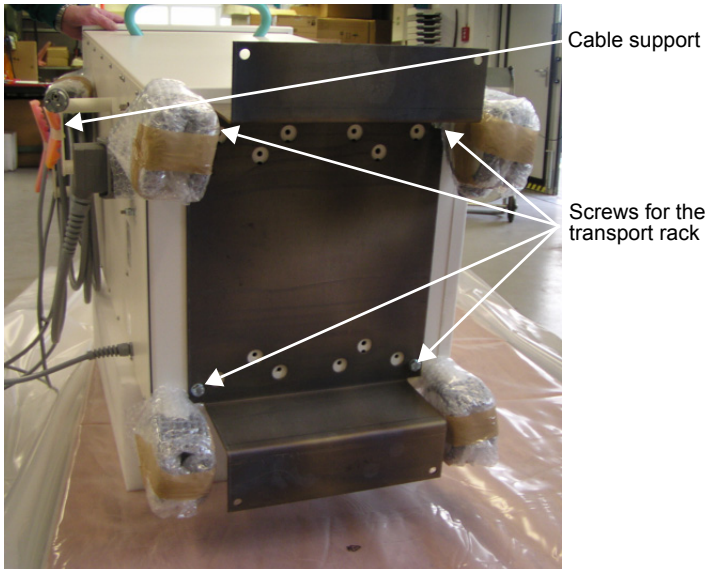


Fig. 12-7 Monitor cart with transport rack attached

- Put the monitor cart back into an upright position with the help of a second person and remove the foam rubber block from the pallet.

- Position the monitor cart on the pallet as illustrated in *Fig. 12-8* (at a distance of 180 mm / 80 mm from the pallet edge).

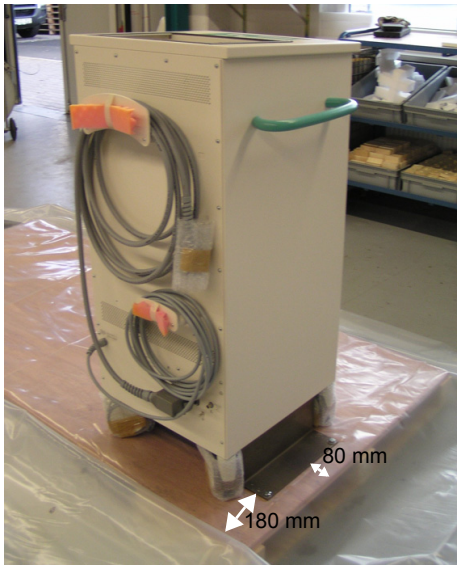


Fig. 12-8 Position of the monitor cart on the pallet

- Attach the transport rack to the pallet using the corresponding wood screws.

USA:

Drill three holes for the round head square neck bolts.

Fasten the transport rack with the corresponding wood screw (from above, because of the pallet stringers) and the round head square neck bolts (from below) to the pallet.

- Clean the monitor cart with Bioclean (n/a for USA).

NOTE

At this point, you must interrupt the monitor cart packing procedure and prepare the C-arm stand first (→ *p. 12-12*), as the C-arm stand needs to be connected to the monitor cart and the monitor cart to the power supply for proper packing (→ *Ch. 12.7, p. 12-10*).

- Wrap the monitor cart in foam rubber and bubble wrap.
- Attach a styrofoam block (20 mm to 50 mm) on top of the monitor cart.

Fig. 12-9 Wrapped monitor cart

12.7 Packing the C-arm stand

To mount the C-arm stand on the pallet, do the following:

- Carefully push the C-arm stand onto the pallet using a ramp.
- Position the C-arm stand as illustrated in *Fig. 12-10*.
- Position the C-arm as illustrated in *Fig. 12-10*.

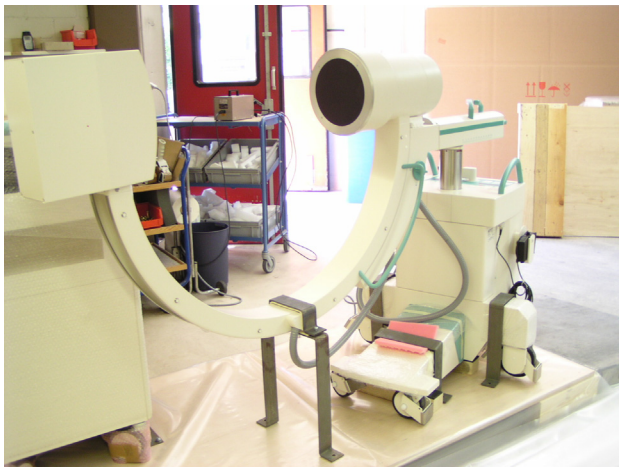


Fig. 12-10 Position of the C-arm stand and the C-arm on the pallet

- Remove the ramp.

NOTE

To use the ramp supplied with a drop shipment, do the following:

– Remove the fixing clamps attaching the ramp.

– Hook up the fixing clamps into the drill holes on the pallet provided for that purpose (→ *Fig. 12-11*).

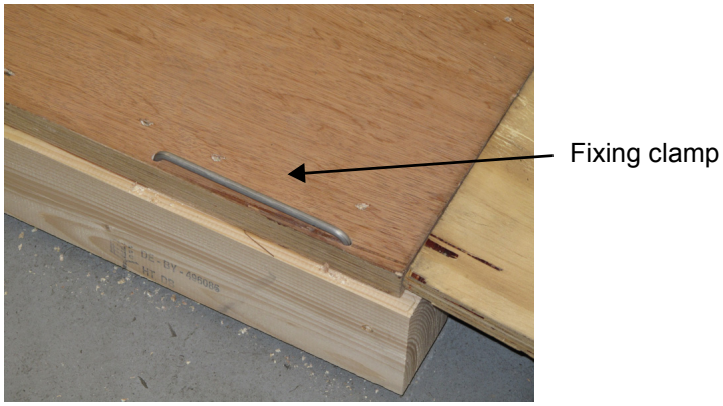


Fig. 12-11 Fixing clamp hooked up in the drill holes on the pallet

- Clean the C-arm stand with Bioclean (n/a for USA).

- Wrap the generator and image intensifier in bubble wrap.
- Jam a 40mm styrofoam block between the image intensifier and the horizontal carriage.

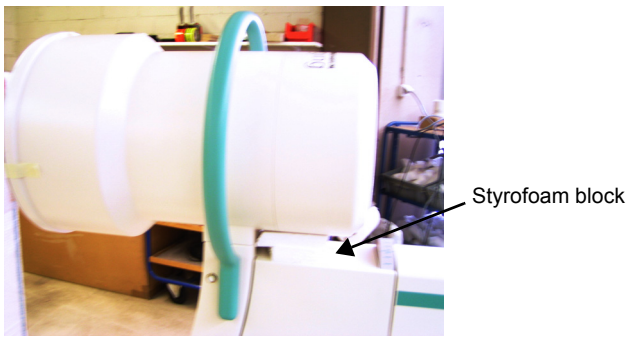


Fig. 12-12 Styrofoam block between image intensifier and horizontal carriage

- Glue the corresponding rubber strips on top of the wooden laths.
- Place the wooden laths below the C-arm stand as illustrated in *Fig. 12-13* and *Fig. 12-14*. Lift the C-arm stand slightly for that purpose.

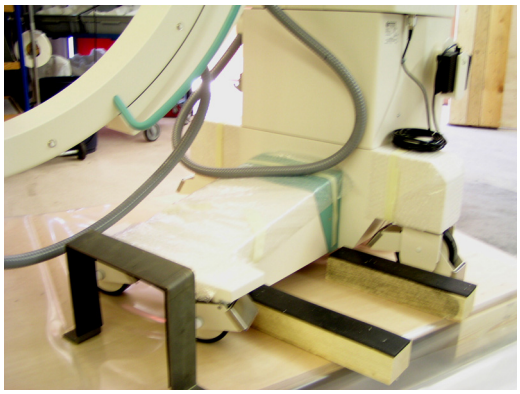


Fig. 12-13 Position of the wooden laths

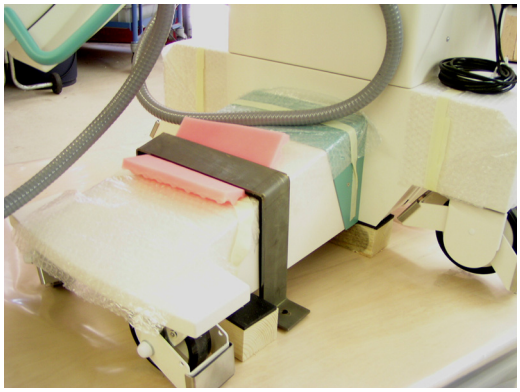


Fig. 12-14 C-arm stand with wooden laths placed below

- First place foam rubber and then retaining bracket 1 over the C-arm stand foot as illustrated in *Fig. 12-14*.
- Place retaining brackets 2 over the laterally protruding feet as illustrated in *Fig. 12-15*.
- Connect the C-arm stand by means of the coupling cable to the monitor cart.
- Connect the monitor cart to the power supply.
- Switch on the C-arm stand.

WARNING

When you press the hand or foot switch, the system starts to emit radiation!

- Press the **Move Up/Down** keys to adjust the vertical position of the C-arm so that retaining bracket 4 can be placed below the C.
- Place retaining bracket 3 over the C-arm so that its feet rest on retaining bracket 4.
- Attach retaining bracket 3 to retaining bracket 4 by means of the corresponding screws, as illustrated in *Fig. 12-15*.
- Press the **Move Up/Down** keys to adjust the vertical position of the C-arm so that retaining bracket 4 rests on the pallet.

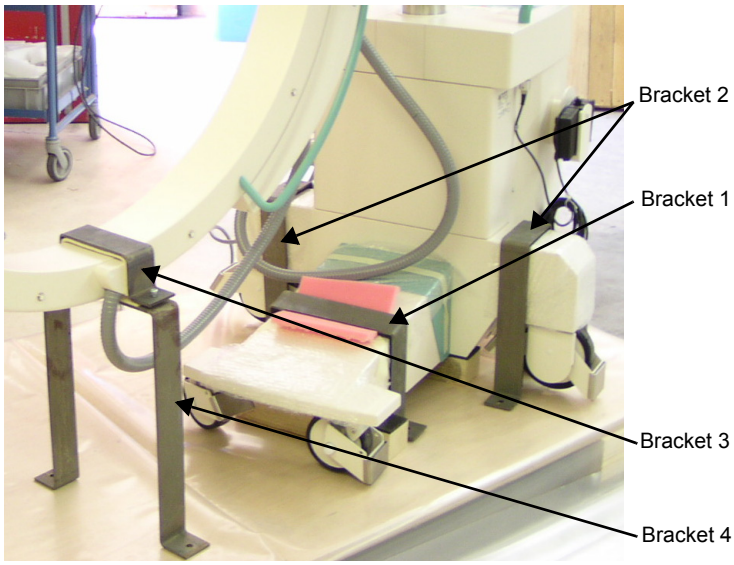


Fig. 12-15 Retaining brackets 1–4

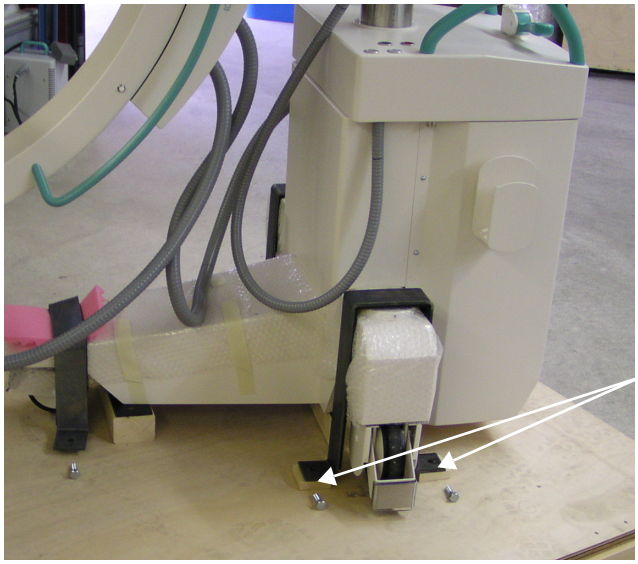


Fig. 12-16 Retaining bracket 2 over left lateral wheel for USA

- Switch off the C-arm stand.
- Disconnect the monitor cart from the power supply.
- Disconnect the C-arm stand from the monitor cart.

NOTE

After having disconnected the C-arm stand from the monitor cart, you must finish the monitor cart packing procedure (→ *p. 12-9*).

- Screw down all retaining brackets using the corresponding screws.

  USA:

  Place the small wooden blocks with pre-drilled holes below retaining bracket 2 over the left lateral wheel (→ *Fig. 12-16*).

  Drill 8 holes for the round head square neck bolts.

  Attach all retaining brackets from below to the pallet using the corresponding round head square neck bolts.

- Wrap the C-arm stand in bubble wrap and pad it with foam rubber and styrofoam material.

- Attach styrofoam material to the C-arm stand as illustrated in *Fig. 12-17*.

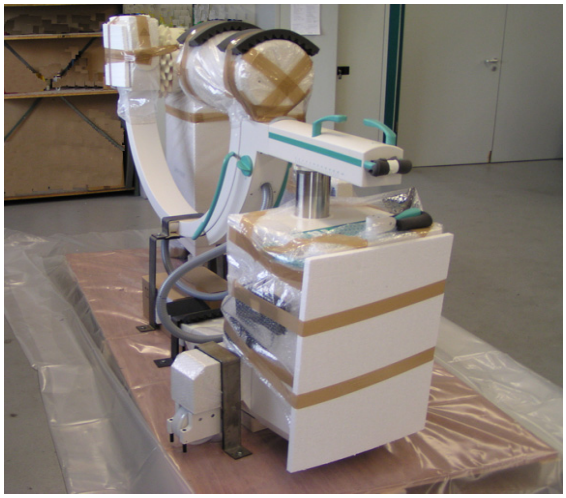


Fig. 12-17 Wrapped C-arm stand

- Jam a foam rubber block between the generator and the monitor cart.

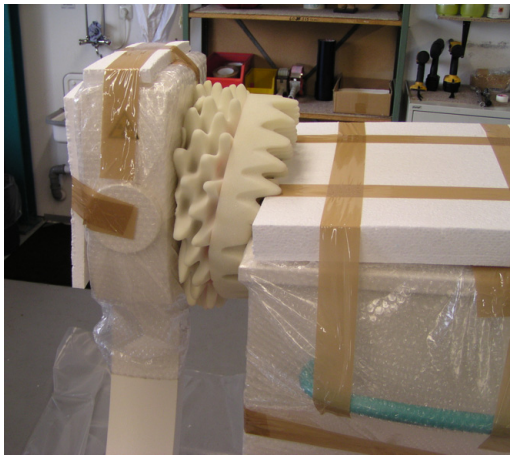


Fig. 12-18 Foam rubber block between generator and monitor cart

12.8 Packing the monitor head

To pack the monitor head, do the following:

- Clean the screen with Foam-Cleaner.
- Wrap the monitor head in bubble wrap (→ *Fig. 12-19*).

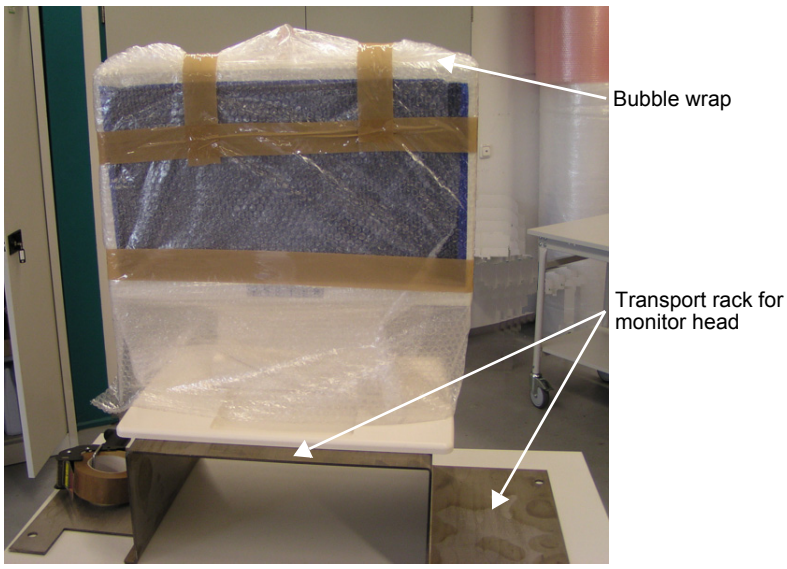


Fig. 12-19 Monitor head on the transport rack

- Place the transport rack with monitor head on the pallet between monitor cart and C-arm stand (*Fig. 12-20*).

  The screws M6×12 that held the monitor head to the monitor cart base are not required at this point. Put them in the accessories box (→ *Ch. 1.3, p. 1-4*).

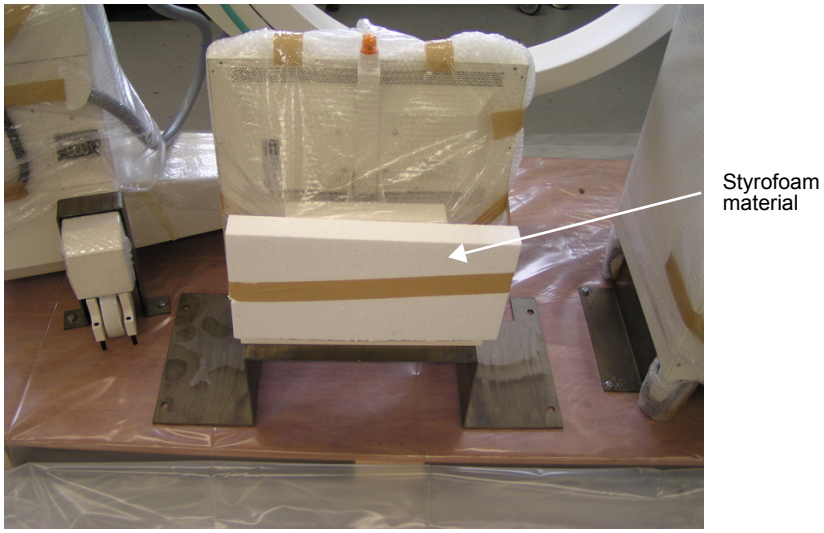


Fig. 12-20 Transport racket with packed monitor head on the pallet

- Attach the styrofoam material on the rear of the monitor head (→ *Fig. 12-20*).
- Attach the transport rack to the pallet using the corresponding wood screws (→ *Fig. 12-21*).

  USA:

  Drill the holes for the round head square neck bolts and attach the transport rack to the pallet using the round head square neck bolts.

Fig. 12-21 Mounted transport rack with packed monitor head

12.9 Packing the ramp

Prerequisites

Before packing the ramp, do the following:

- Fold the wrap foil on the pallet around the system components and heat-seal them but leave a small opening.
- Remove the air from the wrap foil through the opening using vacuum suction.
- Heat-seal the small opening.
- Tape the wrap foil with shipping tape.

To mount the ramp on the pallet, do the following:

- Position the ramp on the pallet as illustrated in *Fig. 12-22*.

Fig. 12-22 Position of the ramp on the pallet

- Position board 1 on the side of the ramp and attach it using two screws (5 × 60 mm) (→ *Fig. 12-23*).
- Put the big cardboard box over the pallet.
- Attach the cardboard box to the pallet using clout nails.
- Position board 2 between cardboard box and board 1 already attached to the ramp.

Fig. 12-23 Packing of the ramp

- Attach board 2 to the outside of the cardboard box using three screws (5 × 40 mm) (→ *Fig. 12-24*).

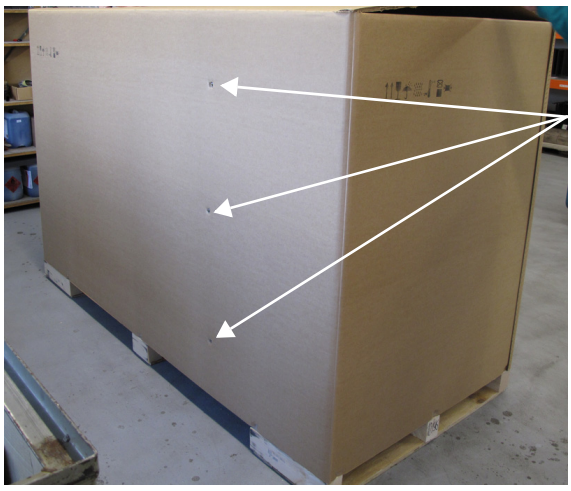


Fig. 12-24 Attachment of the lateral boards

- Position 3 on the opposite inside of the cardboard box and attach board 3 using three screws (5 × 40 mm) from the outside of the cardboard box.
- Attach board 4 to the boards 2 and 3 using two screws (4 × 40 mm).
- Now continue with the packing procedure of the full pallet not yet performed (→ *Ch. 12.10, p. 12-19*).

12.10 Packing the full pallet

To complete packing of the full pallet, do the following:

- Fold the wrap foil on the pallet around the system components and heat-seal them but leave a small opening.
- Remove the air from the wrap foil through the opening using vacuum suction.

Fig. 12-25 Removing the air with suction

- Heat-seal the small opening.
- Tape the wrap foil with shipping tape.

Fig. 12-26 Taped wrap foil

- Put the big cardboard box over the pallet.
- Attach the cardboard box to the pallet using clout nails.

- Close the cardboard box and tape shut it with shipping tape.

Fig. 12-27 Closed cardboard box

- Affix one of the shock watch devices on the cardboard box as illustrated, and a second one on the long side of the cardboard box.

Fig. 12-28 Position of the labels on the short side

- Affix a “Transportkontrolle – Monitored shipment” label above each shock watch device on the outside of the cardboard box (→ *Fig. 12-28*).

- Affix the address label as well as the label “Vorsicht Glas” [Glass – Handle With Care] on the cardboard box as illustrated in *Fig. 12-28* and *Fig. 12-29*.

Fig. 12-29 Labels on the long side

- Secure the cardboard box together with the pallet with plastic straps as illustrated in *Fig. 12-28* and *Fig. 12-29*.

Appendix A

A.1 Manufacturer's Declaration concerning Electromagnetic Compatibility acc. to IEC 60601-1-2 (Class B)

Guidance and Manufacturer's Declaration – electromagnetic emissions

The Ziehm 8000, Ziehm Compact and Ziehm Compact Litho are intended for use in the electromagnetic environment specified below. The customer or the user of the Ziehm 8000, Ziehm Compact or Ziehm Compact Litho should assure that the systems are used in such an environment.

Emissions tests	Compliance	Electromagnetic environment – guidance
RF emissions acc. to CISPR 11	Group 1	The Ziehm 8000, Ziehm Compact and Ziehm Compact Litho use RF energy only for their internal function. Therefore, their RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions acc. to CISPR 11	Class B	The Ziehm 8000, Ziehm Compact and Ziehm Compact Litho are suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions acc. to IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions acc. to IEC 61000-3-3	Complies	

Table A-1 Guidance and Manufacturer's Declaration – electromagnetic emissions

Guidance and Manufacturer's Declaration – electromagnetic immunity

The Ziehm 8000, Ziehm Compact and Ziehm Compact Litho are intended for use in the electromagnetic environment specified below. The customer or the user of the Ziehm 8000, Ziehm Compact or Ziehm Compact Litho should assure that the systems are used in such an environment.

Immunity tests	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Electrostatic discharge (ESD) acc. to IEC 61000-4-2	± 6 kV contact discharge ± 8 kV air discharge	± 6 kV contact discharge ± 8 kV air discharge	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst acc. to IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/ output lines	± 2 kV for power supply lines ± 1 kV for input/ output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge acc. to IEC 61000-4-5	± 1 kV differential mode ± 2 kV common mode	± 1 kV differential mode ± 2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions, and voltage variations on power supply input lines acc. to IEC 61000-4-11	< 5% U_T for 0.5 cycle (>95% dip) 40% U_T for 5 cycles (60% dip) 70% U_T for 25 cycles (30% dip) < 5% U_T for 5 s (> 95% dip)	< 5% U_T for 0.5 cycle (>95% dip) 40% U_T for 5 cycles (60% dip) 70% U_T for 25 cycles (30% dip) < 5% U_T for 5 s (> 95% dip)	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Ziehm 8000, Ziehm Compact or Ziehm Compact Litho requires continued operation during power mains interruptions, it is recommended that the Ziehm 8000, Ziehm Compact or Ziehm Compact Litho be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) magnetic field acc. to IEC 61000-4-8	3 V/m	3 V/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE: U_T is the AC mains voltage prior to application of the test level			

Table A-2 Guidance and Manufacturer's Declaration – electromagnetic immunity

Guidance and Manufacturer's Declaration – electromagnetic immunity

The Ziehm 8000, Ziehm Compact and Ziehm Compact Litho are intended for use in the electromagnetic environment specified below. The customer or the user of the Ziehm 8000, Ziehm Compact or Ziehm Compact Litho should assure that the systems are used in such an environment.

Immunity tests	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
			Portable and mobile RF communications equipment should be used no closer to the Ziehm 8000, Ziehm Compact or Ziehm Compact Litho, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance:**
Conducted RF disturbances acc. to IEC 61000-4-6	3 V_{rms} 150 kHz to 80 MHz	3 V_{rms}	d = 1.2 × SQRT(P)
Radiated RF disturbances acc. to IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	d = 1.2 × SQRT(P) 80 MHz to 800 MHz
			d = 2.3 × SQRT(P) 800 MHz to 2.5 GHz

Table A-3 Guidance and Manufacturer's Declaration – electromagnetic immunity

Immunity tests	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
			where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and *d* is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey[a], should be less than the compliance level[b] in each frequency range. Interference may occur in the vicinity of equipment marked with the following symbol:
NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies. NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			
[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Ziehm 8000, Ziehm Compact or Ziehm Compact Litho are used exceeds the applicable RF compliance level above, the Ziehm 8000, Ziehm Compact or Ziehm Compact Litho should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Ziehm 8000, Ziehm Compact or Ziehm Compact Litho. [b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.			

Table A-3 Guidance and Manufacturer's Declaration – electromagnetic immunity (cont.)

Recommended separation distances between portable and mobile RF communications equipment and the Ziehm 8000, Ziehm Compact or Ziehm Compact Litho

The Ziehm 8000, Ziehm Compact and Ziehm Compact Litho are intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Ziehm 8000, Ziehm Compact or Ziehm Compact Litho can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Ziehm 8000, Ziehm Compact or Ziehm Compact Litho as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	**Separation distance according to frequency of transmitter m**		
	150 kHz to 80 MHz $d = 1.2 \times \sqrt{P}$	**80 MHz to 800 MHz** $d = 1.2 \times \sqrt{P}$	**800 MHz to 2.5 GHz** $d = 2{,}3 \times \sqrt{P}$
0,01	0,12	0,12	0,23
0,1	0,38	0,38	0,73
1	1,2	1,2	2,3
10	3,8	3,8	7,3
100	12	12	23

For transmitters rated at a maximum output power not listed in the above table, the distance can be determined using the equation in the respective column header, where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1: An additional factor of 10/3 is used in calculating the recommended separation distance for transmitters in the frequency range 80 MHz to 2.5 GHz to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient areas.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Table A-4 Recommended separation distances between portable and mobile RF communications equipment and the Ziehm 8000, Ziehm Compact or Ziehm Compact Litho

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